UNIVERSITY OF ALBERTA

International Taxation and the Income Shifting Behaviour of Multinational Enterprises

by

Michael Douglas Hoffman ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfilment of the requirements for the degree of Doctor of Philosophy

Department of Economics

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DEDICATION

To Nadine,
without whose support
this dissertation
would never have been completed.

ABSTRACT

This dissertation examines the ability of MNEs to shift before-tax income between jurisdictions to take advantage of differences in tax rates. To shift income, MNEs can structure transactions between subsidiaries in high-tax and low-tax jurisdictions such that transfer pricing can allow more income to be reported in the low-tax jurisdiction and more expenses to be deducted from income in the high-tax jurisdiction. While global income is unchanged, the MNE's global tax liability can be reduced.

We undertake theoretical and empirical examinations of income shifting. We examine the effects of transfer pricing and income shifting on the user cost of capital when deferral taxation is used and a credit is provided for foreign taxes paid. We find the MNE will shift as much income as possible from a high-tax to a low-tax jurisdiction through cross-border charges, thus reducing the cost of capital. Also, we find an increase in the host-country tax rate actually benefits a MNE provided enough pre-tax income can be shifted to the low-tax jurisdiction. We show a thin capitalisation constraint (a restriction on the debt-to-equity ratio) is binding only when the return on equity exceeds the host-country after-tax interest rate; the foreign tax credit position of the MNE is irrelevant. Further, it may not be not optimal to borrow in the jurisdiction with the higher tax rate.

Empirically, we examine the income shifting behaviour of MNEs that have a presence in Canada. Our data set contains confidential information collected on annual T2 corporate tax returns filed by Canadian-based corporations and includes information not publicly available. We find there is some evidence that MNEs with a presence in Canada are shifting income to subsidiaries in low-tax jurisdictions. Also, we find that income shifting depends upon the size of the international tax differential and the effect of a change in the tax differential is not constant across jurisdictions. Having a subsidiary in a low-tax jurisdiction can have a substantial impact on the Canadian tax liability. Using another data set, we find there is evidence that MNEs are timing payments during times of tax changes.

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Michael Hoffman
Chicago
November 2000

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LIST OF ABBREVIATIONS

AMT	alternative minimum tax
AMTI	alternative minimum taxable income
APA	advanced pricing agreement
C+	cost plus (transfer pricing method)
CCA	capital cost allowance
CCPC	Canadian controlled private corporation
CCRA	Canada Customs and Revenue Agency (formerly Revenue Canada)
CFC	controlled foreign corporation
CPM	comparable profits method (transfer pricing method)
CUP	comparable uncontrolled price (transfer pricing method)
FAPI	foreign accrual property income
FDI	foreign direct investment
FTC	foreign tax credit
GMM	generalised method of moments
HAC	heteroskedastic and autocorrelation consistent
IRS	Internal Revenue Service
MNE	multinational enterprise
PS	profit split (transfer pricing method)
ROW	rest of the world
RP	resale price (transfer pricing method)
SRED	scientific research and experimental design

CHAPTER 1
INTRODUCTION

Multinational enterprises (MNEs) are becoming more important in the global economy. As a result, the foreign direct investment (FDI) of these MNEs has begun to receive more attention. To help explain international capital flows along with the industrial organisation of MNEs, it is important to understand the determinants of FDI. In the past, most economic research relating to the FDI decisions of MNEs focused on non-tax factors. More recently, attention has been given to the system of taxation and its ability to affect the FDI decisions of multinationals.

The system of taxation will play an important role on the activities of the MNE even after the MNE has decided where to locate its international operations. By their very nature, the operations of MNEs are subjected to the tax systems of multiple countries possibly resulting in income being subjected to taxation in more than one jurisdiction. Since corporate tax rates and corporate tax systems are not identical across jurisdictions, a MNE can organise itself in a manner that tries to take advantage of the favourable tax treatment that some jurisdictions offer. For example, the MNE may hold assets in a corporation located in a tax haven in an effort to avoid the taxation of any capital gains that the assets may accrue.

This dissertation addresses some of the key issues associated with the taxation of capital income in an integrated world economy with an emphasis on MNEs. In particular, we look at the ability of MNEs to shift before-tax income between jurisdictions in an effort to take advantage of differences in international tax rates. To shift this income, MNEs can structure transactions between subsidiaries in high-tax and low-tax jurisdictions such that more income is reported in the low-tax jurisdiction and more expenses are deducted from income in the high-tax jurisdiction. While the global income of the MNE is unchanged, the global tax liability can be reduced.

At first glance, it may seem obvious that MNEs engage in income shifting as the tax savings from this activity can be substantial—one only needs to look at the existence of tax havens as evidence. Some interesting questions to ask are: (*i*) if income shifting exists, how pervasive is it, and (*ii*) are the findings consistent with theoretical predictions? We review the related literature and develop a theoretical model to answer the first two questions. We empirically examine the second question using MNEs with a presence in Canada.

This dissertation is organised into six chapters. The first chapter contains an overall introduction to the dissertation. In Chapter 2, we provide an introduction to the general literature on corporate taxation. In particular, we outline foreign direct investment in Canada along with how Canada and the United States tax corporate income. We explain the US system for two reasons. First, it allows us to compare the Canadian tax system to that of one of the largest economies in the world. Second, a vast number of Canadian corporations have linkages to the United States through subsidiaries or parent corporations. As such, many Canadian corporations will have to deal with the US tax system to some degree. We also provide an introduction to the methods used in calculating the transfer price for international intra-firm transactions. Finally, we explore the underlying theory of the direct taxation of capital income and briefly review the related empirical literature. In Chapter 3, we shift our focus to the literature on income shifting and transfer pricing.

In Chapter 4, we develop a theoretical model of transfer pricing and the income shifting behaviour of MNEs. The model incorporates the ability to shift income across borders between entities of the MNE in a manner similar to Weichenrieder (1996). Unlike Weichenrieder (1996), we include the corporate tax rates in both countries and withholding tax provisions, rather than simply defining an effective tax rate and assuming certain conditions are satisfied. We also allow for the parent to be in either a surplus or deficit foreign tax credit position with respect to transfers from the foreign subsidiary. Finally, we allow for debt financing by the foreign subsidiary but impose a restriction on the debt-to-equity ratio that the foreign subsidiary may have (*i.e.*, a thin capitalisation restriction). With this restriction, we can also determine the optimal financial policy when pre-tax income can be shifted to another jurisdiction.

The key contributions of Chapter 4 are as follows. First, when the parent corporation is in a surplus foreign tax credit position, the foreign subsidiary will shift as much pre-tax income as possible to the parent corporation, thus reducing the global tax liability and also reducing the user cost of capital. The income flows are reversed when the parent corporation is in a deficit foreign tax credit position.

Second, the optimal financial policy is independent of the foreign tax credit position of the parent corporation and the thin capitalisation restriction is only binding if the parent corporation's discount rate exceeds the net cost of borrowing. Further, depending upon the source of finance used by the parent corporation, the home country tax rate may not affect the financing decision of the foreign subsidiary.

Finally, an interesting result in our model involves the effect of a change in the host-country tax rate on the user cost of capital. It is possible that an increase in the host-country tax rate can actually *decrease* the user cost of capital provided that it is possible to shift pre-tax income from the foreign subsidiary to the parent corporation. This result suggests that once a MNE has incorporated a subsidiary in a foreign jurisdiction, it is possible that higher tax rates in the foreign jurisdiction can actually lower the user cost of capital. This result comes from the ability of the MNE to avoid the higher tax rate on the pre-tax income that is shifted to the parent corporation while still claiming deductions in the foreign jurisdiction for interest and depreciation expenses. At the higher tax rate, these deductions are more valuable. Provided enough income can be shifted, the user cost of capital declines.

In Chapter 5, we change our focus to applied research and investigate the income shifting in MNEs with a Canadian presence. We are particularly interested in determining if there is evidence that MNEs with a Canadian presence are shifting income to take advantage of international tax differences. If income shifting is present, is the direction of the shifting consistent with theoretical predictions? More importantly, what is the magnitude of this shifting?

An important component of this applied research is the data. Part of our research was undertaken at the Canadian Department of Finance. This allowed us to access a data set that contained information collected from annual T2 corporate tax returns filed by Canadian-based corporations. This data is confidential and contains financial information about the corporations that is not normally available to researchers such as the federal tax liability, the capital consumption allowance claimed, research and development expenditures, and salary expenses. Further, this unconsolidated data overcomes the problem that public firm-level data in Canada is typically reported on a consolidated basis. Access to data has allowed us to empirically examine an important taxation issue that has received little attention in Canada.

We find that there is some evidence that MNEs with a presence in Canada are shifting income to subsidiaries located in low-tax jurisdictions. An analysis of various sub-samples suggests that privately owned Canadian-based corporations are undertaking income shifting to a larger degree than public Canadian-based corporations. It also appears that Canadian-based corporations with a parent located in the United States are able to shift more income than corporations with a parent located in Canada or other jurisdictions.

The effect of the tax rate on cross-border charges is not consistent with expectations. These contrary results suggest that more income is shifted from Canada to the United States when the tax rate in the United States is higher and less income is shifted when the US tax rate is lower. While inconsistent the expected direction of the income flows, the result is consistent with our findings in Chapter 5.

We also find that income shifting depends upon the size of the tax differential and that the effect of a one percent change in the tax differential is not constant across jurisdictions. For example, a one percentage point change in the tax differential will have a larger effect on the Canadian tax liability if the subsidiary is located in Hong Kong than if the subsidiary is located in Ireland. Further, the amount of shifted income can be substantial. By adding a subsidiary in a low-tax jurisdiction such as Hong Kong, the Canadian tax liability can be reduced by as much as 36% or about $8 million for a representative corporation.

Our findings have some important policy implications for Canada. First, the magnitude of the income shifting potential suggests that the Canada Customs and Revenue Agency (CCRA) is justified in devoting resources to transfer pricing audits in an effort to eliminate abusive pricing behaviour. However, even if the CCRA's efforts ensure that all transactions are priced at the arm's-length price, a MNE can still shift income to low-tax jurisdictions by strategically locating income-generating activities (*e.g.*, marketing and sales to the consumer) in low-tax jurisdictions and expense-generating activities (*e.g.*, research and development) in high-tax jurisdictions. By lowering Canadian corporate tax rates, the incentives to shift income away from Canada are reduced. More income will be reported in Canada and the tax base from MNE's will increase. Therefore, it is possible that lower tax rates can generate more tax revenue from MNEs. The question that remains to be examined is the effect of reduced tax rates on the revenues generated from Canadian corporations with purely domestic operations since their tax base will not increase since income shifting is not possible for this group.

In Chapter 6, we make some brief concluding remarks on the dissertation. There are three appendices to this dissertation. The first appendix provides a more detailed derivation of the theoretical model presented in Chapter 4 while the second appendix briefly outlines the theoretical basis for the generalised method of moments estimation used in Chapter 5. In Appendix 3, we focus on taxation and cross-border charges to extend the analysis of Hogg and Mintz (1993) and to complement the empirical analysis done in Chapter 5. Specifically, we use the Hogg and Mintz (1993) data to estimate a slightly revised version of the model in Chapter 5. We find that there is some support for MNEs adjusting their cross-border charges in response to tax changes. However, the response is only to delay charges from one year to the next when it is known that the tax rate in the home country is going to be lower in the next year.

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Weichenrieder, Alfons J. (1996). "Transfer Pricing, Double Taxation, and the Cost of Capital." *Scandinavian Journal of Economics.* 98:3, pp. 445-452.

CHAPTER 2
REVIEW OF THE GENERAL LITERATURE ON CORPORATE TAXATION

2-1. Foreign direct investment in Canada and the United States

Prior to delving into the taxation of capital income, it is worthwhile to understand some basic features of FDI into Canada and Canadian outward FDI. Book value is one measure of FDI. In Table 2-1 and Table 2-2 we provide a summary, by country or region, of the book value of the stock of FDI into Canada. It is important to note that Statistics Canada only includes in this value the FDI for which a foreign investor has at least 20 percent ownership.

The United States has always been a major investor into Canada, representing as much as 87 percent of all Canadian inward FDI in 1950. The United Kingdom historically has been the other major investor in Canada, representing as high as 16 percent in 1930 and, since 1945, maintaining a level of about 10 percent of total Canadian inward FDI.

With increased globalisation, other countries are investing larger amounts in Canada. After peaking in 1980, the percentage of total Canadian inward FDI from the United States has been on a steady decline. Japan and other Pacific Rim countries along with other European countries are making more FDI in Canada. Despite the erosion of the US share of total inward FDI into Canada, the absolute amounts have continued to increase.

Outward FDI by Canada has followed a similar pattern as Canadian inward FDI as is shown in Table 2-3 and Table 2-4. The United States has been the favourite location of Canadian FDI abroad, ranging from 78 percent of total outward FDI in 1950 to 54 percent in 1995. As with inward FDI, the total amount of outward FDI to the United States has increased, but has declined as a percentage of the total. The United

Kingdom has generally been the location of the second highest proportion of Canadian outward FDI. It was not until 1995 that the rest of Europe represented a larger proportion than the United Kingdom. Canada has tended to make more outward FDI to the rest of the Pacific Rim than the Pacific Rim has made in Canada; only since 1991 has Canada begun to make significant FDI in Japan.

Canada has always been a net importer of capital through FDI. Table 2-5 shows the net inward FDI as well as the ratio of inward to outward FDI. We can see that net inward FDI grew until 1980 after which there was a decline followed by a brief increase and a further sharp decrease in 1990 and 1995. It is interesting to note that the ratio of Canadian inward to outward FDI has declined significantly in the past 25 years.

2-2. Corporate taxation in Canada and the United States

There are many complexities to the corporate income tax structure. This section is intended to provide an introduction to the system of taxation in Canada but is by no means intended to be exhaustive. This presentation is intended to be general and the reader should recognise that there may be many exceptions in the tax system that would affect the tax rates outlined below. To provide an example of the tax treatment of a Canadian subsidiary of a foreign corporation, we also provide a summary of the tax provisions in the United States that would apply to Canadian subsidiaries of US corporations.

2-2.1. Corporate taxation in Canada

Taxation of domestic-source income

For tax purposes, income from business or property and net capital gains are taxable. Canadian-resident corporations[1] owned by Canadians and non-residents are taxed on the basis of world-wide income.

Corporations are subject to both federal and provincial corporate income taxes. In 2000, the basic federal rate is 38 percent and is reduced by a 10 percent abatement on taxable income earned in a province or territory, resulting in a net federal tax rate of 28 percent. All provinces impose corporate income taxes on income that can be allocated to a permanent establishment located in the province. The provincial tax rates vary from 9.15 percent to 17 percent of taxable income.[2] Income is allocated to a province using a formula that allocates income based on gross revenue in the province (fifty percent) and salaries and wages paid in the province (fifty percent).[3] Provincial income taxes cannot be deducted from taxable income when calculating the federal tax liability.

Corporations are subject to a surtax of four percent which is calculated on the base amount of the net federal tax. This surtax results in an increase in the total federal tax rate of 1.12 percent for a combined tax rate of 38.37 percent to 46.12 percent on taxable income. Table 2-6 provides a summary of the 2000 Canadian corporate tax rates.[4]

---

[1] A corporation is considered resident in Canada for tax purposes if it is incorporated in Canada or its central management and control are located in Canada.

[2] Provincial rates for manufacturing corporations range from 2.5% in the Yukon Territories to 17% in Manitoba and New Brunswick.

[3] The general formula is that the share of the tax base allocated to a province is equal to the sum of a permanent establishment's revenues and payroll at the point of sale divided by two. Special formulas apply to income earned from finance and insurance, transportation and other specific activities.

[4] Canadian-controlled private corporations (CCPC) are subject to a different tax regime. These corporations receive a small business tax deduction which lowers the net federal tax rate to 12

The federal government also imposes a capital tax of 0.2 percent on the taxable capital employed in Canada by large corporations (those with over $10 million in taxable Canadian capital). This tax applies to both resident and non-resident corporations but is reduced by the corporation's federal surtax. Financial institutions are subject to an additional capital tax of 1 percent on taxable capital of $200 million to $300 million and 1.25 percent on taxable capital over $300 million. The tax on financial institutions can be reduced by any income taxes that are otherwise payable. The provinces also impose their own taxes on capital, but unlike provincial income taxes, the provincial capital taxes are deductible for federal income tax calculations. Provincial capital taxes range from provincial zero to 3 percent of capital employed within the province.

In general, corporations pay the federal goods and services tax on their purchases, charge the tax on their sales, and remit the net amount to the federal government. Provincial sales taxes, ranging from 6.5 percent to 12 percent, are charged in all provinces except Alberta which imposes no provincial sales tax.

Taxation of foreign-source income

Canadian-resident corporations that carry on business in a foreign country are subject to Canadian taxes on the income earned in the foreign country. In general, foreign-source income is calculated using the rules that apply to calculating domestic-source income. If the Canadian-resident corporation is undertaking business in a foreign country through branch operations and not through a controlled foreign corporation (CFC), the income of the branch, when earned, is directly subject to Canadian taxation. The same tax rates apply to foreign-source branch income as apply to domestic-source income.

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percent on the first $200,000 of annual business income. This deduction is only available for CCPCs with less than $15 million in taxable paid-up capital employed in Canada.

If income is derived from a permanent establishment located in the foreign country, the income will also be subject to foreign taxation. Double taxation of foreign-source branch income can be avoided through the use of a credit system. Under Canada's tax treaties, there are provisions for foreign taxes paid on foreign-source income provided the Canadian-resident corporation carries on business through a permanent establishment located in the foreign country and the foreign taxes are attributable to the permanent establishment. The foreign tax credit is available for foreign income or profit taxes only. Credits are calculated on a country-by-country basis and are not refundable. However, Canada has no specific rules for allocating foreign taxes to foreign-source income.

The foreign tax credit is calculated separately for business and other income. Foreign-source business taxes that cannot be completely credited against the Canadian tax liability on the foreign-source business income may be carried back for three years or forward for seven years. Foreign non-business taxes have no carry-over provisions.

Foreign losses are deductible when calculating world-wide income. As Arnold, Li and Sandler (1996) note, it is not surprising that standard tax planning often involves the use of a foreign branch during the start-up period followed by the conversion to a foreign subsidiary once operations begin to generate profits.

Foreign portfolio income such as dividends, interest, rent, and royalties must be included in the Canadian-resident corporation's income. Foreign income and withholding taxes levied on this income are creditable against Canadian tax liabilities. As with branch income, credits are calculated on a country-by-country basis and are not refundable. There are no provisions to carry over to future tax years any surplus foreign tax credits on portfolio income. However, foreign tax credits can be deducted from world-wide income. Foreign-source losses on portfolio investments are fully deductible when calculating world-wide income.

Dividends received by a Canadian-resident corporation from a foreign corporation are included in the taxable income of the Canadian-resident corporation. To relieve double taxation, a combined exemption, credit, and deduction system is used.

Dividends received from a foreign affiliate are assumed to be paid first out of the exempt surplus of the foreign affiliate, then paid out of the taxable surplus, and finally paid out of the pre-acquisition surplus.

The exempt surplus consists of active business income earned in countries with which Canada has a tax treaty, certain capital gains, the exempt portion of capital gains (25 percent), inter-affiliate dividends received out of the exempt surplus of the foreign affiliates, and certain amounts deemed to be active business income. Since the dividends are paid from the exempt surplus, the income is exempt from income taxation in Canada.

When dividends are paid from the taxable surplus of the foreign affiliate, there are direct and indirect foreign tax credits available for the portion of dividends that are repatriated from the taxable surplus. The taxable surplus consists of foreign accrual property income (FAPI), active business income earned in non-treaty countries, certain taxable capital gains, and dividends out of the taxable surplus of another foreign affiliate.

For dividends paid out of the taxable surplus of a foreign affiliate, a deduction for the indirect foreign taxes paid is given when computing the taxable income of the Canadian corporation and a the Canadian corporation can claim a credit for direct taxes (the withholding taxes) paid on dividends. The indirect credit is computed separately for each foreign affiliate. Credits are subject to the same limitation as the basic foreign tax credit (*i.e.*, non-refundable) but surplus foreign tax credits can be carried forward indefinitely.

If dividends from a foreign affiliate are paid from the pre-acquisition surplus (*i.e.*, dividends paid in excess of the exempt taxable surplus) they are treated as a return of capital. Such dividends are deductible from the Canadian-resident corporation's taxable income but the cost of the shares of the foreign affiliate must be reduced accordingly.

As Arnold, Li, and Sandler (1996) note, the ordering rule for dividends paid by a foreign affiliate allows the Canadian corporation to defer indefinitely the Canadian tax liability on dividends paid from taxable surplus. In addition, the MNE can avoid distributions from the taxable surplus by making a return of capital or an upstream loan.

If the foreign corporation is not a foreign affiliate,[5] a credit is given for foreign withholding taxes paid on the dividends up to 15 percent; excess withholding taxes are deductible from world-wide income. No dividend tax credit is granted, and there is no exemption or credit given for foreign income taxes paid.

Foreign accrual property income (FAPI) rules

FAPI rules are intended to prevent Canadian-resident corporations from avoiding Canadian tax liabilities by diverting or accumulating income in a CFC. Canadian-resident corporations are not subject to taxation on the income of a CFC until the income is repatriated or the corporations sells its interest in the CFC. The ability to defer the Canadian tax liability can be advantageous when the CFC is located in a country where corporate tax rates are lower than in Canada. Under FAPI rules, certain passive income earned by a CFC is deemed to be income of the Canadian-resident corporation when it is earned by the CFC, and is therefore subject to Canadian taxation.

FAPI rules apply only to CFCs, which are those corporations controlled directly or indirectly by five or fewer Canadian residents. Since a corporation must first be a foreign affiliate to be considered a CFC, FAPI rules do not apply when ownership is less than 10 percent of any class of shares of the foreign corporation. The determination of the status of a foreign corporation is done with respect to each shareholder but FAPI rules only apply to Canadian shareholders. Therefore, a foreign corporation may be both a foreign affiliate and CFC to one shareholder and only a foreign affiliate to another shareholder.

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[5] A foreign affiliate is defined as a foreign corporation in which a Canadian corporation owns at least 1% of the shares of any class, and the corporation and related parties own at least 10%.

FAPI includes income from property, income from investment-type businesses, certain capital gains, and certain business income derived from Canadian sources; it does not include base company sales and services income. Therefore, a Canadian-resident corporation can have a CFC in a tax haven and use the CFC to sell goods and services to related parties outside Canada, or sell goods acquired from the Canadian-resident parent corporation and the income is not subject to FAPI rules. FAPI also excludes certain interest, rent, royalties, and other similar payments received by a CFC from another foreign affiliate or a related non-resident corporation, provided that the payment is deductible in computing the payer's active home-based business income.

Logistically, FAPI rules operate on a transactional basis. All income items earned by a CFC must be characterised as FAPI or other income. The FAPI of CFCs is included in the income of the Canadian-resident corporation. The amount is considered income from a share in the foreign corporation and is not a dividend.

FAPI rules in Canada do not operate on a country-by-country basis; in most other jurisdictions, FAPI applies only to countries that are designated as low-tax countries. Canadian-resident corporations are entitled to a credit for foreign income taxes paid on the FAPI as well as any withholding taxes applied to dividends paid out of previously-taxed FAPI provided the FAPI was included in the Canadian-resident corporations' income within the past five years. When income is repatriated through dividends issued by the CFC that are paid out of previously-taxed FAPI, no Canadian taxes are collected on the dividends. Any capital gains realised on the disposition of shares of a CFC are tax-free for any previously taxed and undistributed FAPI. However, any foreign taxes credited and subsequent dividends received will reduce the adjusted cost base of the shares of the CFC. Any FAPI losses cannot be claimed by the Canadian-resident corporation, but may be carried forward to offset positive FAPI in subsequent years.

Taxation of non-resident corporations

Non-resident corporations are taxed only on their Canadian-source income derived from operations in Canada, as well as on capital gains arising from the disposition of taxable property in Canada. Tax treaties between Canada and other countries can reduce the tax rate and whether or not a non-resident is taxable in Canada. Canada's tax treaties typically provide that residents of the other country are only subject to Canadian taxes on income from operations in Canada if the non-resident has a Canadian permanent establishment.

Withholding taxes are levied on interest, dividends, royalties, and some management and technical service fees, and similar payments made by a Canadian resident to a non-resident (*e.g.*, payments from a Canadian subsidiary to a foreign parent corporations). Canada imposes a 25 percent withholding tax on dividend payments made to non-residents. Corporations cannot deduct dividend payments when computing taxable income. Withholding taxes can be reduced through tax treaties between Canada and the non-residents' country of residence. More recent tax treaties provide for a 5 percent withholding tax rate, while other treaties provide for rates as high as 15 percent. The withholding tax is applied on the gross amount of the payment.

Generally, interest paid by a corporation is deductible when calculating taxable income, provided the interest payments are associated with debt that is issued for the purpose of earning income. For certain interest payments made to non-residents, Canada imposes a 25 percent withholding tax on the gross amount of the payment. Treaty-reduced rates range from 10 to 15 percent with more recent treaties adopting the lower rate. However, interest paid on certain arm's-length long-term (*i.e.*, five years) debt may not be subject to any withholding taxes. There is also an explicit provision in most treaties for higher withholding tax rates on interest and royalties in excess of fair market values in non-arm's-length transactions. Further, a nil rate may apply in some circumstances. Individual treaties should be consulted.

Rents and royalties are deductible from taxable income provided the expenditure is incurred for the purpose of earning income. As with dividends and interest, royalty payments to non-residents are subject to a 25 percent withholding tax on the gross amount of the payment. Tax treaties can reduce this rate to 10 percent, but some types of royalties are exempt from withholding taxes altogether.

The profits of a foreign corporation that carries on operations in Canada through a branch are taxed at the normal corporate rates. An additional branch tax of 25 percent tax is imposed on after-tax profits less increases in the branch's investment in Canadian property. The branch tax operates in the same manner as withholding taxes and can be reduced by tax treaties. Table 2-7 provides a summary of the Canadian schedule of withholding and branch taxes for various countries.

Thin capitalisation

Thin capitalisation refers to a corporation, typically a CFC, that is financed by debt and very little equity. Governments are concerned about thin capitalisation because it can erode the tax base of the corporation since interest payments are a deductible expense. Therefore, a corporation financed by debt and little equity can pay less in taxes than a corporation financed with little debt and sizeable equity. The government will not be concerned about thin capitalisation if the lender is a taxable resident in the same jurisdiction as the borrower. While the corporation can deduct the interest expenses from taxable income, the lender will be subject to income taxation on the same interest payments. Provided both the corporation and the lender are taxed at the same rate, there is no impact on government revenues; the revenues are simply collected from a different entity.

A problem occurs when the lender is in a foreign jurisdiction or if the lender is a tax-exempt entity. The non-resident recipient of the interest payments is subject to host-country withholding taxes. But, the lender's withholding tax rate tends to be lower than the borrower's income tax rate. While the host government does collect revenue, the absolute amount will tend to be lower since the interest payment is deductible from the host-country taxable income and the withholding taxes collected on the interest payment is less than the host-country tax rate. To avoid the erosion of the tax base by taking advantage of thin capitalisation, governments have adopted thin capitalisation rules.

Canada has adopted a complex and inflexible approach to thin capitalisation, preventing a Canadian-resident corporation from deducting interest on a portion of its loans from non-resident shareholders who have a substantial ownership in the Canadian-resident corporation.[6] When such outstanding debt exists, a corporation is not permitted to deduct a percentage of interest where the outstanding debts exceed three times the permitted equity. Legislation provides definitions for debt and equity that are to be used when calculating the ratio. The legislation also addresses a financing arrangement that could be used to circumvent thin capitalisation rules. For example, the lender cannot make a loan to a third-party financial intermediary on the condition that the financial intermediary makes a loan to the Canadian-resident corporation.

For Canadian subsidiaries of foreign MNEs, the Canadian tax base receives some further protection through the use of withholding taxes on dividends. As Arnold, Li, and Sandler (1996) note, relatively high withholding tax rates on dividend distributions make it more costly for foreign-owned Canadian subsidiaries to substitute debt for equity.

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[6] A non-resident shareholder who has a substantial ownership in the Canadian-resident corporation is defined to be a person who, either alone or together with persons whom that person is not dealing at arm's length, owns or has a right to own either shares possessing 25 percent or more of the voting rights of the corporation or shares possessing 25 percent or more of the fair market value of the corporation.

Acceptable transfer pricing methods[7]

In Canada, transfer pricing regulations are developed by Finance Canada and passed by Parliament, while the implementation and interpretation is done by the Canada Customs and Revenue Agency (CCRA, formerly Revenue Canada). Transfer pricing legislation is found in section 69 of the *Income Tax Act*. Under the legislation, the arm's-length standard is adopted. International intra-firm transactions must be priced in a manner that is reasonable under the circumstances.

In 1987, Revenue Canada adopted Information Circular 87-2 which was designed to clarify the transfer pricing rules. The regulations outline the acceptable pricing methods: comparable uncontrolled price, resale price, cost plus, and "other" methods, with the comparable uncontrolled price method having priority. The comparable uncontrolled price, resale price, and cost plus methods are transactions-based methods. They look for comparable transactions between unrelated parties in order to proxy the related-party transaction. Since comparable transactions are often difficult to find, other methods can be used, provided that the methodology leads to a price that is acceptable given all the facts and circumstances. The information circular also includes specific rules that are similar to the US rules for transfers of tangibles, business services, and intangibles. Canada has also adopted an advance pricing agreement (APA) procedure that allows a corporation to enter into an agreement with the CCRA with respect to the pricing methodology that will be used on particular future transactions.

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7. The various transfer pricing methodologies are described in section 2-3.

If the CCRA believes the transfer prices for transactions between related parties do not adhere to the arm's-length standard, the MNE's taxable income and the corresponding tax liability can be adjusted and penalties can be imposed.

2-2.2. *Corporate taxation of foreign subsidiaries located in the United States*

We address the taxation of foreign subsidiaries located in the US because many Canadian based corporations have operations in the United States. The empirical analysis in Chapter 5 focuses on Canadian-based corporations and many of these corporations have US operations. Further, the analysis in Appendix 3 focuses on wholly-owned Canadian subsidiaries of US MNEs. Therefore, we outline the key US tax practices as the relate to foreign subsidiaries located in the United States.

The US has complicated and sophisticated rules for the taxation of foreign-source income of CFCs. As in Canada, US corporations are subject to federal taxes on their world-wide income, including income from foreign branches. In general, a US corporation is not taxed on the earnings of a foreign subsidiary until dividends are repatriated, or the subsidiary is sold or liquidated. However, several exceptions may apply, resulting in taxation of some or all the earnings of a foreign subsidiary. Table 2-8 provides a summary of the US corporate tax rates.

Foreign branch income is generally taxable if the income is effectively connected with a US trade or business. If a tax treaty exists with the country where the foreign branch is located, business profits are taxable in the US only to the extent that income is attributable to a permanent establishment in the United States.

The United States also has an alternative minimum tax (AMT) formula. The AMT is intended to prevent corporations with substantial income from using preferential deductions and credits to greatly reduce their tax liability. The AMT is a separate system with limitations on deductions and credits. The corporation must determine the alternative minimum taxable income (AMTI) on which a tax rate of 20 percent is imposed. Corporations pay the higher of the AMT or the regular tax.

Taxation of foreign-source income

To avoid double taxation, the United States provides relief through a system of credits for foreign taxes paid on foreign-source income earned both directly and indirectly. Provisions also exist whereby the taxpayer may deduct foreign taxes from US taxable income rather than receiving a credit. Unlike most countries, the US has detailed statutory rules that define the criteria that foreign income taxes must satisfy in order to be creditable.

Credits are non-refundable in that the foreign tax credit cannot exceed the US tax liability on the foreign income. Limitations are applied separately to several baskets that differentiate between passive and active foreign business income. Within each basket there is a world-wide limitation that permits the averaging of high and low foreign taxes on income within the basket. Losses in one basket are not deductible from US source income if there are positive balances in any of the other baskets; losses must be reallocated proportionally among the other baskets based on the amount in each basket as a proportion of total foreign income. Surplus credits within any basket may be carried back two years or forward for five years.

Foreign-source portfolio income must be included in world-wide income. Subject to basket limitations, a credit is provided for any foreign taxes paid on the income.

Dividends received by a US corporation are included in US taxable income. A credit is granted for any foreign withholding taxes paid on the dividends. This credit is subject to certain basket limitations. When the dividends are received from a CFC, the corporation is eligible for an indirect foreign tax credit for foreign taxes paid on the income from which the dividend was paid. This credit is only available for three tiers of subsidiaries of foreign corporations. The actual computation of the indirect foreign tax credit is very complex.

Limitations on deferrals: CFC rules

Controlled foreign corporation rules for income deferral (termed "Subpart F" rules in the United States) are similar in intent to Canadian FAPI rules. Subpart F rules apply to foreign corporations if more than 50 percent of the shares are owned by US shareholders at any time in the CFCs tax year. Only US persons with ownership of at least 10 percent of the voting shares of the foreign corporation are taken into account when determining if the foreign corporation is a CFC. As with Canadian FAPI rules, Subpart F rules are applied on a transactional basis.

Only US taxpayers who directly or indirectly own at least ten percent of the voting shares of the CFC at any time in the year and who own shares directly or indirectly at the end of the year are taxable on their share of the CFCs tainted income. Tainted income includes items such as passive income, insurance income, and income from sales and services derived from transactions with related parties outside the CFCs country of residence. If a CFCs passive income and foreign base company income exceed 70 percent of it total gross income, all income is attributed to US shareholders.

The only exemption provided by Subpart F rules is for passive income, insurance income, and foreign base company income that is subject to an effective foreign-tax rate that is at least 90 percent of the US corporate tax rate. Relief provisions, such as the non-taxation of dividends received out of previously taxed CFC income, are similar to Canadian FAPI rules.

Thin capitalisation

The Internal Revenue Service (IRS) has the authority to reclassify thin capitalisation for corporations located in the United States. Therefore, foreign affiliates located in the United States are subject to the IRS reclassified thin capitalisation.

In general, the IRS will compare the level of capitalisation to an arm's-length situation. Consideration is given to factors such as the debt-to-equity ratio, repayment provisions, the ability to pay interest from current income, and the relationship between the parties. These subjective tests contrasts the thin capitalisation rules in Canada.

To more effectively control thin capitalisation, objective earnings stripping rules were developed in 1989. If a corporation exceeds the safe harbour debt-equity ratio of 3:2, interest on related-party loans is defined to be disqualified interest if the recipient of the interest is not subject to US tax, or is subject to tax at less than the US non-treaty rate of 30 percent. Disqualified interest is disallowed to the extent that the US corporate group has excess interest expenses. However, any disallowed interest may generally be carried forward indefinitely.

Acceptable transfer pricing methods

The US transfer pricing law is developed by the Treasury Department, passed by Congress, and implemented and interpreted by the IRS. The cornerstone of the US legislation is section 482 of the *Internal Revenue Code*. Under the legislation, income earned on transactions between related parties must be determined by the arm's-length standard.

In 1968, the Treasury Department developed the first set of regulations on section 482. The regulations require that the prices charged for transactions between related parties are to be tested against the arm's-length standard using one of four methods, in order of priority: comparable uncontrolled price, resale price, cost plus, and "other" methods.

To reduce the use of below-cost transfer of intangibles to offshore foreign subsidiaries, the US transfer pricing regulations were revised in 1986. Under the new regulations, intangibles had to be priced commensurate with the income from the intangibles. Further revisions, approved in June 1994, added the comparable profits method and the profit split method to the list of acceptable methods. The regulations also eliminated the hierarchy of pricing methods. Now the pricing method should be chosen given the facts and circumstances of the case. In support of the pricing policy, MNEs are required to undertake a functional analysis. This functional analysis is an economic evaluation of the activities, responsibilities, resources, and risks of each of the related parties.

Advance pricing agreements can be made with the IRS. Also, instead of going to the tax courts to settle disputes, the IRS and the MNE can agree to use binding arbitration.[8]

If the IRS Commissioner believes that transfer prices do not adhere to the arm's-length standard and related parties have allocated income in order to avoid taxation, the Commissioner may reallocate income and deductions and determine the "true" taxable income of each party. The tax liability is then calculated on the true taxable income, and penalties can be imposed. To avoid penalties, the MNE must be able to support the pricing methodology. For this reason, the use of functional analysis is important.

2-3. Transfer pricing methodology

There are five major methods used by governments around the world to arrive at a transfer price that will proxy the arm's-length price. The five methods can be grouped into two categories: transactional-based methods and profit-based methods. The transactional-based methods include ***comparable uncontrolled price***, ***resale price***, and ***cost plus*** while the profit-based methods include the ***profit split method*** and the ***comparable profits method***. In Canada, the United States, and OECD countries, there is a commitment to using the transactional-based methods over the profit-based methods. We outline the five methods below.

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[8] Binding arbitration was first used in 1994 to settle a case with Apple Computer that had been ongoing since the early 1980s.

2-3.1. Comparable uncontrolled price method

Under the comparable uncontrolled price (CUP) method, it is necessary to find a transaction where the MNE sells the same product in a comparable transaction with an unrelated party, or a transaction where the same or similar product is being traded between two unrelated parties under the same or similar circumstances. All the facts and circumstances related to the transaction must be taken into account. For example, product characteristics, market location, trade volumes and risks need to be comparable. Adjustments to the external price can be made to more closely estimate the arm's-length price.

Consider the following example.[9] CANCO sells television sets directly to its US subsidiary, USCO. CANCO and other Canadian corporations also sell television sets in the United States to unrelated parties through a commissioned sales agent. By custom, the product is sold FOB (free on board–without freight or insurance added) from the purchaser's factory. An average US transaction price, based on sales by commissioned agents, is available from these agents. The appropriate CUP is calculated as follows. The average external market price is $500. The external price includes the agent's commission and the cost of freight. Since CANCO does not pay any commission and transportation costs for the transaction with USCO, we must deduct these components from the external market price. Suppose the freight is $30 and the agent's commission was $25. The total deductions are $55 so the transfer price using the CUP method is $500 less $55 or $445. If CANCO sold televisions directly to unrelated US corporations, the transfer price for the related-party transaction would simply be the same as the price charged to the unrelated parties. In our example, we need to take the different circumstances into account.

The CUP method is preferred by the tax authorities because it is transaction and product specific and more information about the specific transaction is known than in any other pricing method. Also, the interests of the buyer and the seller are taken into account as the price is simply determined by the intersection of supply and demand. As Eden (1998) notes, the method assumes the two firms are willing to bargain and the CUP price is the outcome of the bargaining.

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[9] The examples that follow in the section are from Eden (1998), pp. 37-52.

2-3.2. *Resale price method*

When it is not possible to find a comparable product, the CUP method cannot be used. The alternative is to focus on one side of the transaction–either the manufacturer or the distributor. With the resale price (RP) method, the price is found by looking for firms at similar trade levels that perform similar distribution functions. As Eden (1998) notes, the RP method is best used when the distributor adds relatively little value to a product so that the value of its function is relatively easy to determine.

The RP method assumes that distributors engage in competition and therefore, they all earn similar returns on sales. Consider an example. Assume that a UK parent sells British-made automobiles directly to its Canadian subsidiary, CANCO, and CANCO has sole distribution rights in Canada. The automobiles retail for $20,000. The price that the UK parent should charge CANCO for the automobiles can be found as follows. CANCO and the UK parent know that the profit margin earned by independent Canadian distributors of automobiles averages about eight percent. However, CANCO incurs advertising and warranty costs of about $700 per vehicle; these expenses are not normally incurred by independent distributors. If the 8% margin is subtracted from the sale price and the advertising and warranty expenses are also subtracted, the RP method yields a transfer price of $17,700.

This method works backwards to find the transfer price by subtracting the profit margin from the sale price and also making any adjustments for the facts and circumstances of the transaction. The RP method only evaluates the transaction in terms of the buyer in the sense that the buyer receives an arm's-length return that is consistent with the returns earned by similar corporations. Under this method, all excess profits are assigned to the seller. Therefore, the RP method tends to overestimate the transfer price since it gives all unallocated profits to the manufacturer.

2-3.3. Cost plus method

In the cost plus (C+) method, the manufacturing side of the transaction is examined. This method looks at the cost of production and then adds an appropriate mark-up. As with the RP method, the appropriate mark-up is estimated by examining the mark-up earned by similar manufacturers. The C+ method is assuming that competitive markets lead to mark-ups over costs in arm's-length transactions that are approximately the same. While the RP method works best when the distributor adds little value to the transaction, the C+ method works best when the producer is a simple manufacturer without complicated activities so that the true costs and returns can be more easily estimated.

Consider the following example. CANCO manufactures perfume for itself and three foreign affiliates at a standard cost of $6.40 per ounce. The formulations for the foreign affiliates are customised for the tastes of each market at an additional cost of 5%. Other perfume manufacturers in Canada prepare bulk formulations for a mark-up of 20% over standard costs. Adding the 20% mark-up to the standard costs plus the additional 5% results in a C+ transfer price of $7.50 per ounce.

In the C+ method, it is necessary to know how the cost base is calculated. For example, is the cost base calculated using manufacturing costs (*e.g.*, cost of goods, overhead costs, depreciation, and material input costs), or are some operating costs (*e.g.*, selling costs, administrative costs, research and development expenses) included?

The C+ method focuses only on the profit mark-up of the seller. Therefore, this method underestimates the transfer price because it gives all unallocated profits from the transaction to the buyer.

2-3.4. Profit split method

When the transactional-based methods are not feasible, the regulations suggest the use of "other" methods. The most common other method is the profit split (PS) method whereby profits from a transaction are split between the two parties. The consolidated profits from a transaction are used to find a back-door approach to the transfer price. There are a variety of ways to split profits, but the most common approach is based on the return on operating assets.

Consider the following example. Firm A manufactures and sells 100 lamps to firm B at a transfer price of $1.50 per lamp for total revenue of $150. The cost of goods sold is $120 and operating costs are $10 leaving an operating profit of $20 or $0.20 per lamp. Operating assets for firm A are $500, so the return on assets is 4% for firm A. The purchaser, firm B, sells the lamps for $2.00 per unit. After subtracting the purchase price of the lamps ($1.50) and additional costs related to selling the lamps ($0.20), the operating profit is $0.30 per lamp. Firm B has $1500 in operating assets so the return for firm B is 2%.

The overall profit is $0.50 per lamp or $50 for the transaction. Since firm B has three times the assets of firm A, the profits are allocated with firm A receiving 25% ($12.50) and firm B receiving 75% ($37.50). Each firm earns a 2.5% rate of return. For firm A to earn a profit of $12.50, the transfer price must be $1.425 (the $12.50 profit plus the $10 operating costs plus the $120 cost of goods equals $142.50 in revenue).

While the PS method seems relatively simple, there are important issues to consider. What profit measure should be used? How should the profits be split? What activities should be included in the analysis?

2-3.5. *Comparable profits method*

There are several steps to determining the comparable profits method (CPM) transfer price. The key components are that a profit level indicator is selected as a benchmark. A group of unrelated firms are selected as comparables. The profit level indicator for each uncontrolled firm is calculated and these ratios are used to determine a range of operating incomes (called the *arm's-length range*). The firm's operating income is within the arm's-length range, the transfer price is considered to be acceptable. If the operating income falls outside the range, the transfer price is set to some point within the range, typically the mean or the median.

As an example, suppose firm A makes lamps and sells them to firm B at a transfer price of $1.50 per lamp. Using the comparable profits method, the rate of return for uncontrolled firms ranges from 5% to 8% for an average of 6.5%. In this case, the minimum income is $25 (five percent of $500 in operating assets) and the maximum income is $40. These incomes define the arm's-length range with the midpoint being $32.50. Recall from the example in the PS method that the operating profit for firm A was $20. Since this price is outside the range, the tax authority adjusts the profit to the midpoint of the range ($32.50) which implies a transfer price of $1.625 ($32.50 profit plus $10 operating costs plus $120 in cost of goods). Note that this reduces firm B's operating profits to $17.50 ($200 in revenue less $162.50 for the lamps from firm A less $20 in operating costs). Given the operating of assets for firm B are $1500, the return on assets is only 1.1%.

2-3.6. *The practical side of the transfer pricing methodologies*

In practice, one methodology must be chosen to approximate the arm's-length price. The exact price is not actually determined in the analysis. Instead, an acceptable range is calculated and the actual transaction price must fall within the range. If one party to the transaction undertakes research and development, marketing, and is the owner of the intangible property and the other company acts as a basic manufacturer, a basic distributor, or a basic service provider, it is preferable to examine the side of the transaction from the standpoint of the undertaker of the simple activity (the tested party).

Suppose one entity acts as a simple manufacturer because it assembles computer motherboards for the parent corporation and the parent corporation undertakes all the research and development and marketing and assumes the risks associated with these activities. The analysis of the transfer price involves comparing the profitability of the tested party with the profitability of comparable corporations.

After searching for a comparable set of corporations (*e.g.*, similar SIC code, similar geographic location, and similar research and development activities and other risks) that are uncontrolled entities, some financial ratios are calculated (*e.g.*, return on sales and return on capital employed) and then a range of one particular financial ratio is found. The choice of the financial ratio will depend upon the activity of the tested party and the comparables. For example, if the tested party is a distributor, then return on sales is a common choice, whereas return on capital employed is a common choice for manufacturers. From this ratio, the interquartile range is found for the comparable corporations. The same ratio for the tested party is then found. If the ratio for the transfer price is in the interquartile range, then the MNE is considered to be setting a transfer price that is at an arm's-length price.

In conducting the analysis, the IRS requires that each methodology be considered and an explanation be given as to why each methodology is chosen or eliminated. The analysis is certainly not an exact science, and that is why a range of acceptable prices is found. For more information on the application of the methodologies, see Eden (1998).

2-4. Theory of the direct taxation of capital income

The residence and source principles for international taxation represent the two polar examples of how income can be taxed. The residence principle taxes the residents of a country on their world-wide income regardless of where that income was earned; non-residents do not pay taxes to the domestic country for income generated in the domestic country. Under the source principle, income is only taxed by the country where the income was generated, regardless of the residence of the income recipient. In this case, domestic residents are not taxed by the domestic government for income earned abroad.

It is not uncommon for a country to apply some combination of these two principles. For example, the residence principle may be applied to capital income whereas the source principle may be applied to labour income. Unless the home and foreign countries adopt the same taxation principle, it is possible for income to be subject to double taxation—the same income is taxed by both countries. Double taxation can be eliminated by a system of domestic tax credits for foreign taxes paid.

To illustrate the residence and source principles, and to understand how double taxation arises and how it can be eliminated, consider the following simple model.

There exist two countries, designated H and F for home and foreign. Assume perfect capital mobility and let the marginal product of capital, r, be the same in both countries. Let h and f represent residents of home and foreign respectively.

For simplicity, let us assume that h only generates income in the foreign country. We define the effective tax rate paid by h on that income as:

$$\begin{aligned} T_h &= \tau_h^H + \tau_h^F - c_h^H \tau_h^F \\ &= \tau_h^H + \left(1 - c_h^H\right)\tau_h^F \end{aligned} \tag{2.1}$$

where T_h is the effective tax rate paid by *h* on the income generated in the foreign country, τ_h^H is the home tax rate paid on the income, τ_h^F is the foreign tax rate paid on the income, and c_h^H is the rate at which the home country credits *h* for the income taxes paid to the foreign country with $c_h^H \in [0,1]$.

The home country can choose the pair $\left(c_h^H, \tau_h^H\right)$ when determining the effective tax rate paid by *h* on income generated in the foreign country. Note that the choice of the pair is not unique. We can see from equation (2.1) that if $T_h = \tau_h^F$ then the home country does not collect any revenue from its residents on their income generated in the foreign country; revenue is only collected if $T_h > \tau_h^F$. Also, if $T_h < \tau_h^F$ then the residents of the home country are paying a higher tax rate on their income generated in the foreign country than on their income generated at home.

2-4.1. *Both countries adopt the source principle of taxation*

A pure source-based system of taxation occurs when the income generated in the home country is only taxed by the home country, regardless of the residency of the income recipient; residents of the home country are not taxed by the home country for income earned in the foreign country. Therefore, it must be the case that $\tau_h^H = 0$ and *f* is taxed in the home country on income generated in the home country at the rate $\tau_f^H > 0$. Tax credits are typically not refundable and therefore the home country will not refund any taxes paid in the foreign country that are in excess of those that would have been paid had the income been generated in home country. This implies that $T_h = \tau_h^F$. Since both countries adopted the same principle of taxation, it must follow that $T_f = \tau_f^H$ if we assume *f* only generates income in *H*. Therefore, *H* only taxes *f* because *f* is the only individual generating income in *H* and conversely, *F* only taxes *h*. No double taxation exists but tax rates may differ across countries. Under the source principle, the tax system in a country treats all corporations operating in the country the same in that they are all taxed at the same rate. In this case, the country's tax system exhibits capital import neutrality, thus contributing to international competitiveness.

2-4.2. *Both countries adopt the residence principle of taxation*

A pure residence-based system of taxation results when a corporation's world-wide income is taxed based on their country of residence regardless of where the income is generated. In this case $\tau_h^F = 0$ and conversely *f* is not taxed in the home country on income generated in the home country, so $\tau_f^H = 0$. Since, by the very nature of the residence-based system (*i.e.*, since $\tau_h^F = 0$), there is no need to credit *h* for income taxes paid to the foreign country, we can assume $c_h^H = 0$ and now $\mathrm{T}_h = \tau_h^H$. Since both countries adopted the same principle of taxation, it must follow that $\mathrm{T}_f = \tau_f^F$ and no double taxation occurs, but tax rates may vary. Under the residence principle, all foreign-source income is subject to the same effective tax rate as domestic-source income. In this case, capital export neutrality is achieved, leaving the MNE indifferent between investing in the domestic market or the foreign market.

2-4.3. *Countries adopt different principles of taxation*

Double taxation will arise when home and foreign do not adopt the same principle of taxation. Consider the example where the home country adopts a pure residence-based system while the foreign country adopts a pure source-based system. Initially assume that the home country does not provide any credit for foreign taxes paid (*i.e.*, $c_h^H = 0$).

It is now the case that $\tau_h^H > 0$ and $\tau_h^F > 0$ and $\mathrm{T}_h = \tau_h^H + \tau_h^F$; *h* is taxed twice on the income earned in the foreign country. Note that $\mathrm{T}_f = 0$ since *f* is not taxed by either country due to the principles of taxation that each country has adopted.

One method of eliminating the double taxation on *h* is for the home country to provide a tax credit for foreign taxes paid. If we set $c_h^H = 1$, then the home country will credit *h* for τ_h^F resulting in $T_h = \tau_h^H$ which is the same effective tax rate as when both countries adopted the residence-based system of taxation. However, it is not typical for countries to refund tax credits. Therefore, if $\tau_h^H < \tau_h^F$, *h* will not receive a credit for all taxes paid to the foreign government. If the home country has a lower tax rate, *h* will pay τ_h^F. If the home country has a higher tax rate, *h* will pay τ_h^F to the foreign country and $\tau_h^H - \tau_h^F$ to the home country. Therefore, if the home country has a higher tax rate, double taxation is not eliminated, but *h* is no worse off than had the income been generated at home.

An alternative to providing a credit to *h* for foreign taxes paid is for the home country to deduct foreign taxes paid from the taxable income base. This would have the same effect on T_h as choosing c_h^H in the range (0,1); some degree of double taxation will exist since *h* is being taxed by *F* on all foreign income and *H* is taxing on the after-foreign-tax income; the net-of-foreign-tax income is subjected to double taxation.

The traditional viewpoint is that world-wide efficiency is enhanced when there are no tax distortions. Therefore, credits for foreign taxes paid are preferred to both deductions and no provisions for foreign taxes paid since only credits eliminate double taxation of capital income. Credits will eliminate the possibility of an anti-trade bias in the tax system.

From a national standpoint, an argument is made for the deduction method based on national efficiency in that a country maximises its welfare based on rents, net of foreign taxes paid. Musgrave (1969) notes that capital exporting countries will in general prefer deductions over credits because credits surrender tax revenue from foreign income to the foreign country. However, Hamada (1966) shows how the credit system can make both countries better off through a more efficient world-wide allocation of capital. The Hamada (1966) result is driven by the ability of the tax credit scheme to yield an efficient allocation of capital.

Taking a different approach, Bond and Samuelson (1989) show that in an environment of tax competition, the tax rate adopted by each country will depend upon the tax rate adopted by the other country as well as the provisions for foreign taxes paid. Each country adopts a tax rate on capital income that maximises its national income. Bond and Samuelson (1989) are able to show that capital flows will be greater under a regime of tax deductions compared to a regime of tax credits; they also determine that both countries are better off under the tax deduction system. The Bond and Samuelson (1989) analysis is based on the premise that tax rates and capital location decisions emerge as an equilibrium in a tax-setting game played by the two countries. Under the game, the results are based on comparing the equilibrium outcomes under the two tax systems rather than the outcomes for fixed tax rate levels and capital locations.

Oakland and Xu (1996) build on the Bond and Samuelson (1989) analysis to show that a system of no allowance for foreign taxes paid will actually increase capital flows. Tax competition is key to the results as the competition often undermines the beneficial aspects of integrating the income taxes of the home and foreign countries.

2-5. Capital mobility and taxation

An important assumption that is generally made in studies of international taxation is that capital is internationally perfectly mobile. There is extensive empirical evidence to contradict this assumption. For example, there is a lack of international portfolio diversification, real interest rates differ across countries, and there is a high correlation between domestic savings and investment. Many studies have attempted to provide explanations as to why capital is internationally immobile.[10]

Recently, Gordon and Bovenberg (1996) have focused on asymmetric information as a possible explanation for the lack of international capital mobility. Previous studies, which assumed symmetric information, suggest that corporate income taxes should not be imposed in small open economies. The rationale for no corporate income taxation is that if a country imposes a tax on capital income, the tax will be shifted to the immobile factors (*i.e.*, labour). Therefore, a direct tax on the immobile factor (labour) is preferred to a direct tax on capital income. Eliminating taxation on capital income removes any disincentives for investment.

Since taxes on capital income exist, and are generally rather high, Gordon and Bovenberg (1996) suggest that capital is not perfectly mobile and the cause of the lack of mobility is asymmetric information between countries. Put simply, individuals in one country are assumed to know more about investments and their corresponding risks in their own country than investment in a foreign country.

Under the assumption of asymmetric information, Gordon and Bovenberg (1996) try to show how predictions from the model can be consistent with the empirical evidence on imperfect capital mobility, in particular, the presence of capital taxation. They find that the optimal tax policy is one of subsidies to capital imports and no taxation on capital exports. Instead of explaining the presence of capital taxation, their model exacerbates the contradiction between the theoretical arguments for no capital taxation and the empirical evidence of such taxes. Gordon and Bovenberg (1996) also note that it is difficult to find a case of subsidies to capital imports, at least in developed countries. In fact, they suggest that political pressure would result in higher taxes on foreign subsidiaries than on domestic corporations. While the results do not solve the contradiction between theory and the empirical evidence, the introduction of asymmetric information has promise for explaining capital immobility. Further research in this area is needed.

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[10] For example, see Finn (1990), Summers (1988), French and Poterba (1991), Krugman (1981). For a more extensive list, and for a brief discussion of the explanations these papers provide, see Gordon and Bovenberg (1996).

2-6. General review of empirical literature on capital income taxation

In recent years, there has been an increase in the amount of empirical research in the area of capital income taxation. MNEs are becoming more important in the global economy. Much of the research is concerned with assessing whether or not the existing systems of capital income taxation are consistent with global efficiency. Particular focus has been placed on examining the system of capital income taxation as it pertains to MNEs. In this section, we provide a brief introduction to some of the recent empirical findings in the area of international capital income taxation.

Giovannini *et al.* (1993) note that the residence principle is the globally superior international tax regime as it satisfies the criterion of capital-export neutrality.[11] Unfortunately, while many developed countries have adopted the residence principle, there is empirical evidence that capital-export neutrality is not achieved; for various reasons, significant discrimination exists between the taxation of domestic- and foreign-source capital income. Giovannini *et al.* (1993) indicate that an important question to address is: how does the world allocation of capital, research and development, and tax revenues respond to tax incentives?

It is often the case that tax laws treat portfolio investments differently than FDI. Gordon and Jun (1993) examine the role of tax and non-tax factors for the two forms of investment. Their empirical study, which uses data on portfolio and foreign direct investment for ten countries with investment in the United States from 1980 to 1989, finds that the composition of the equity flows (*i.e.*, either portfolio or FDI) significantly differs among these ten countries. They conclude that part of the reason for the difference can be attributed to tax differences. However, Gordon and Jun (1993) are unable to find any significant change in the behaviour of investment from the ten countries during the 1980s despite many important changes to the tax rates, thus not supporting their hypothesis. They suggest two explanations for the lack of response. First, capital controls in the sample countries may limit the response. Second, tax policy is likely an endogenous variable; if investors of country *i* are able to invest abroad more easily than investors of country *j*, it is more likely that country *i* has relatively fewer capital controls and tax distortions.

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[11] Capital export neutrality occurs when the tax system is neutral towards causing the export of capital from home to abroad and, as such, residents of the home country are indifferent between investing at home or abroad.

Most theoretical models of investment suggest that tax policies will affect FDI. However, empirical studies of inbound FDI to the US have generated few robust conclusions.

Auerbach and Hassett (1993) extend the simple models of investment by distinguishing between the different tax treatments provided to new and existing capital under the US tax laws. This distinction is important because much of the increases in FDI in the 1980s came from foreign acquisitions of existing capital and not from new investments. Auerbach and Hassett (1993) find that given the different tax treatments of these two forms of investment, and the likely effects of the *Tax Reform Act* of 1986 on acquisitions of capital, it is not appropriate to attribute the increase in FDI of the 1980s to tax changes. Therefore, it appears that it is important to carefully specify the tax incentives for alternative forms of FDI.

A key area of interest to policymakers is investment in research and development and the manner in which taxation can impact a firms' decision of how much to invest in research and development and where to make that investment. Hines (1993) addresses this issue by modelling the incentives provided under US tax law for the level and location of research and development undertaken by MNEs. Specifically, he estimates the effects of changes in the tax price of research and development on the level of research and development performed in the US by US-based multinationals. In determining the tax price of research and development, Hines (1993) considers the effects of a MNE's foreign tax-credit position and the effects of mergers and acquisition activity on the characteristics of the firms in the sample data.

Hines (1993) finds that changes in the after-tax price of research and development have statistically significant effects on the spending decisions of US-based MNEs. However, the economic importance of this result is less clear. Hines (1993) notes that it is necessary to compare the costs of raising alternative revenues to fund more generous tax incentives for research and development by MNEs (assuming a balanced-budget approach to taxation) with any externality benefits of undertaking the research and development domestically.

In another study, Hines (1996) compares the distribution of foreign investment among the US states, distinguishing between the countries that grant foreign tax credits and those that provide no credits. Specifically, Hines (1996) examines the effects of state tax rates on the distribution of FDI within the United States. He compares the pattern of more lightly taxed investments (those from countries where investors receive foreign tax credits and therefore have less incentive to avoid US tax liabilities) with the pattern of investments from countries where investors are fully taxed. The empirical work suggests that high state tax rates have a significantly negative effect on foreign investment in the state. In fact, investors who cannot claim credits for state tax payments appear to reduce their investment shares relative to investors who receive foreign tax credits by nine to eleven percent for every one percent of taxation.

2-7. Summary of general literature on corporate taxation

In this section, we outline the key literature on corporate taxation. In particular, we discuss the corporate taxation systems in Canada and the United States. We also outline the various transfer pricing methodologies that can be used to price international transactions between entities of a MNE. We describe the theoretical considerations of international corporate taxation, discussing the theory of the direct taxation of capital income along with taxation and capital mobility.

All the literature suggests policymakers must take many factors into consideration when determining the tax policy to adopt as the incentives these policies create can result in significant changes to the manner in which a MNE operates in the global economy. In the remaining chapters, we focus our attention on MNEs and income shifting.

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Table 2-1 **Canada's inward foreign direct investment**
Year end book value; millions of current dollars

Year	United States	United Kingdom	Rest of Europe	Japan	Rest of Pacific Rim	ROW	TOTAL
1930	1,993	392	42	0	0	0	2,427
1940	2,064	362	51	0	0	0	2,477
1950	3,549	468	81	0	0	0	4,098
1960	11,210	1,550	730	0	38	116	13,644
1970	22,054	2,641	2,210	103	39	495	27,542
1980	50,368	5,772	6,662	605	131	2,330	65,868
1985	67,874	8,643	9,025	2,250	970	3,891	92,653
1990	84,353	18,158	18,096	5,214	3,034	6,651	135,506
1995	113,092	16,477	23,938	6,702	5,096	9,971	175,276

Source: CANSIM Matrix 4189.

Table 2-2 **Canada's inward foreign direct investment**
Year end book value; percentage of total

Year	United States	United Kingdom	Rest of Europe	Japan	Rest of Pacific Rim	ROW	% of GDP
1930	82%	16%	2%	0%	0%	0%	40.4
1940	83%	15%	2%	0%	0%	0%	35.5
1950	87%	11%	2%	0%	0%	0%	21.4
1960	82%	11%	5%	0%	0%	0%	34.6
1970	80%	10%	8%	0%	0%	2%	30.9
1980	76%	9%	10%	1%	0%	4%	21.3
1985	73%	9%	10%	2%	1%	4%	19.4
1990	62%	13%	13%	4%	2%	5%	20.2
1995	65%	9%	14%	4%	3%	6%	22.6

Source: CANSIM Matrix 4189, Matrix 6628

Table 2-3 **Canada's outward foreign direct investment**
Year end book value; millions of current dollars

Year	United States	United Kingdom	Rest of Europe	Japan	Rest of Pacific Rim	ROW	TOTAL
1930	260	14	12	1	22	134	443
1940	412	58	26	1	24	160	681
1950	775	65	17	0	26	107	990
1960	1,618	257	91	15	74	413	2,468
1970	3,273	586	489	48	299	1,493	6,188
1980	16,781	2,860	1,985	109	1,522	3,710	26,967
1985	39,586	4,399	3,858	276	3,690	5,415	57,224
1990	55,475	11,706	8,142	919	6,296	8,924	91,462
1995	76,505	13,760	16,725	3,219	11,503	20,635	142,347

Source: *CANSIM Matrix 4188*

Table 2-4 **Canada's outward foreign direct investment**
Year end book value; percentage of total

Year	United States	United Kingdom	Rest of Europe	Japan	Rest of Pacific Rim	ROW	% of GDP
1930	59%	3%	3%	0%	5%	30%	7.4
1940	60%	9%	4%	0%	4%	23%	9.7
1950	78%	7%	2%	0%	3%	11%	5.2
1960	66%	10%	4%	1%	3%	17%	6.3
1970	53%	9%	8%	1%	5%	24%	6.9
1980	62%	11%	7%	0%	6%	14%	8.7
1985	69%	8%	7%	0%	6%	9%	12.0
1990	61%	13%	9%	1%	7%	10%	13.6
1995	54%	10%	12%	2%	8%	14%	18.3

Source: *CANSIM Matrix 4189, Matrix 6628*

Table 2-5 Net inward FDI and ratio of inward to outward FDI

Year end book value; millions of current dollars and ratio

Year	Net Inward FDI	Ratio Inward:Outward
1930	1,984	5.5
1940	1,796	3.6
1950	3,108	4.1
1960	11,176	5.5
1970	21,354	4.5
1980	38,901	2.4
1985	35,429	1.6
1990	44,044	1.5
1995	32,929	1.2

Source: CANSIM Matrix 4188, Matrix 4189.

Table 2-6 2000 Canadian corporate tax rates

	Non-Manufacturing Rates			Manufacturing Rates		
Province	Federal[1]	Provincial	Combined	Federal[1]	Provincial	Combined
British Columbia	29.12	16.50	45.6	22.12	16.50	38.6
Alberta	29.12	15.50	44.6	22.12	14.50	36.6
Saskatchewan	29.12	17.00	46.1	22.12	10.00	32.1
Manitoba	29.12	17.00	46.1	22.12	17.00	39.1
Ontario	29.12	15.50	44.6	22.12	13.50	35.6
Quebec	29.12	9.15	38.3	22.12	9.15	31.3
New Brunswick	29.12	17.00	46.1	22.12	17.00	39.1
Nova Scotia	29.12	16.00	45.1	22.12	16.00	38.1
Prince Edward Island	29.12	16.00	45.1	22.12	7.50	29.6
Newfoundland	29.12	14.00	43.1	22.12	5.00	27.1
Yukon Territory	29.12	15.00	44.1	22.12	2.50	24.6
Northwest Territories	29.12	14.00	43.1	22.12	14.00	36.1

Source: Adapted from PricewaterhouseCoopers (2000).

1. The federal rate is 38% for non-manufacturing and 31% for manufacturing. There is a 10% abatement in this rate for any income allocated to a province and subject to provincial taxation. A 4% surtax is applied to the net-of-abatement rate.

Table 2-7 Summary of Canadian withholding and branch tax rates for various countries

Recipient[1]	Dividends[2]	Interest[3]	Royalties[4]
Resident corporations and individuals	nil	Nil	nil
Non-resident corporations and individuals			
All Non-treaty Countries	25%	25%	25%
Treaty Countries			
Australia	15%	15%	10%
Belgium	15%	15%	10%
Brazil	15% or 25%[5]	15%	15% or 25%
France	5% or 15%[5]	10%	10%
Germany	15%	15%	10%
Ireland	15%	15%	15%
Japan	10% or 15%[5]	10%	10%
Mexico	10% or 15%[5]	15%	15%
Netherlands	5% or 15%[6]	10%	10%
Singapore	15%	15%	15%
Switzerland	15%	15%	10%
United Kingdom	10% or 15%[5]	10%	10%
United States	5% or 15%[7]	10%	10%

Source: Adapted from Price Waterhouse (1997).

1. In a number of instances the lower treaty rates do not apply if the recipient is not the beneficial owner of the income and/or the income is not taxable in the recipients country of residence.
2. In treaty negotiations, Canada is prepared to accept a withholding tax rate of 5% on direct dividends (those paid by a Canadian affiliate to a foreign parent or other corporation with a substantial interest in the affiliate).
3. Interest paid on certain arm's-length long-term (five-year) indebtedness may not be subject to any withholding tax. Interest on certain debt obligations may be exempt from source-country tax. There is explicit provisions in most treaties for higher withholding tax on interest in excess of fair market values in non-arm's-length circumstances. A nil rate of tax may apply in certain circumstances.
4. In treaty negotiations, Canada is prepared to eliminate the withholding tax on arm's-length payments in respect of rights to use patented information or information concerning scientific experience. It is also willing to negotiate exemptions from withholding taxes for payments for the use of computer software. There is explicit provisions in most treaties for higher withholding tax on interest in excess of fair market values in non-arm's-length circumstances. A nil rate of tax may apply in certain circumstances.
5. The lower rate applies where the beneficial owner of the dividend is a company that owns/controls a specified interest in the paying company. The nature of the ownership requirement, the necessary percentage (10%, 20%, or 25%) and other relevant interest (*e.g.*, capital, shares, voting power, equity percentage) vary by treaty.
6. The 5% rate applies if the beneficial owner of the dividends is a company that holds at least 25% of the capital or at least 10% of the voting power of the company paying the dividends.
7. Where the beneficial owner of the dividend is a company that owns at least 10% of the voting stock of the payer, the withholding tax rate is reduced to 5%.

Table 2-8 1997 corporate income tax rates in the United States

Taxable Income Range			Tax Rate: Tax on Minimum	Tax Rate: Tax on amount over minimum
$0	-	$49,999	$0	15%
$50,000	-	$74,999	$7,500	25%
$75,000	-	$99,999	$13,750	34%
$100,000	-	$334,999	$22,250	39%[1]
$335,000	-	$9,999,999	$113,900	34%
$10,000,000	-	$14,999,999	$3,400,000	35%
$15,000,000	-	$18,333,332	$5,150,000	38%
$18,333,333+			$6,416,667	35%

Source: Adapted from Price Waterhouse (1997).

1. The tax rate of 39% is designed to eliminate the benefit of the 15% and 25% tax rates; the 38% tax rate is designed to eliminate the benefit of the 34% rate.

CHAPTER 3
INTRODUCTION TO THE LITERATURE ON INCOME SHIFTING

3-1. Theoretical considerations

A ***transfer price*** is a price that is used for intra-firm trade between affiliates of a MNE. The price is internal and can facilitate the reallocation of profits between the firms that comprise the MNE. Hirshleifer (1956) proves that the efficient transfer price for intra-firm transactions is the marginal cost of the selling firm. Efficiency is achieved in the sense that the efficient transfer price results in an efficient allocation of resources between the firms that comprise the MNE, and global profits of the MNE are maximised. If there exists a perfectly competitive outside market where transactions costs are zero, the shadow transfer price is simply the market price. Hirshleifer (1957) also proves that the shadow transfer price is also the arm's-length transfer price.

Horst (1971) and Copithorne (1971) prove that, in the presence of tariffs and differentials in the corporate taxation of each affiliate of the MNE, the transfer price that maximises global net profits no longer, in general, equals the marginal cost of production. Horst (1971) examines horizontally-integrated trade while Copithorne (1971) studies vertically-integrated trade.[1]

3-2. Horst (1971) model

Horst (1971) develops a model that examines the horizontally integrated MNE. Assume the MNE has monopolistic power in two national markets. The MNE chooses the optimal transfer price and allocates resources given tariffs and corporate taxes.

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[1] Eden (1985) develops a model that integrates both horizontal and vertical trade. We will summarise the main results of the Horst (1971) and Copithorne (1971) models.

Assume marginal cost is positive and increasing and price discrimination between countries is possible.

Let firms 1 and 2 produce identical products and let firm 1 export any surplus production to firm 2. Consider the benchmark case where there are no taxes or tariffs, implying $t_i = t_j = \tau = 0$. The global profit function of the MNE is

$$\Pi = [R_1 - C_1 + P_{12}(X_1 - D_1)] + [R_2 - C_2 - P_{12}(D_2 - X_2)] \tag{3.2}$$

where Π is the MNE's global profits, and for firm *i*, R_i is total revenue, C_i is the total cost of producing output X_i, D_i is the volume of domestic sales (domestic demand), and P_{12} is the profit maximising transfer price firm 1 charges firm 2 for exports to firm 2.

The terms in (3.2) represent the profits of the exporter and importer respectively. The market clearing condition requires that total MNE output must equal total MNE sales:

$$X_1 + X_2 = D_1 + D_2 \tag{3.3}$$

Maximising (3.2) with respect to X_i and D_i, subject to (3.3) results in the following first-order condition for a global profit maximum in the benchmark case:

$$r_1 = c_1 = r_2 = c_2 \tag{3.4}$$

where r_i is marginal revenue and c_i is marginal cost for firm *i*. As we expect, P_{12} does not appear in (3.4) since P_{12} simply affects the distribution of profits among firms. Since there are no taxes or tariffs, P_{12} will not affect the global profits of the MNE.

Introducing tariffs and corporate profit taxes result in a new global profit function:

$$\Pi = (1 - t_1)[R_1 - C_1 + P_{12}(X_1 - D_1)] + (1 - t_2)[R_2 - C_2 - (1 + \tau)P_{12}(D_2 - X_2)] \tag{3.5}$$

where τ is the tariff and t_i is the corporate tax rate in country *i*.

Maximising (3.5) with respect to X_i and D_i, subject to (3.3) results in a new first-order condition for a global profit maximum:

$$r_i = c_i \qquad \text{for } i = 1,2 \tag{3.6}$$

$$c_2 = c_1 + \tau P_{12} - T(P_{12} - c_1) \tag{3.7}$$

where T is the tax differential, $(t_2 - t_1)/(1 - t_2)$. These results imply that sales in each market are determined by equation (3.6) whereby marginal revenue is equated to marginal cost. Equation (3.7) equates the marginal cost of production of the importing firm (firm 2) to the marginal cost of imports. The marginal cost of imports is equal to the marginal cost of production for firm 1 (the exporter) plus the unit tariff cost, τP_{12}, less any tax advantage to producing in the exporting country, $T(P_{12} - c_1)$.

Horst (1971) shows that the profit-maximising transfer price will depend on the comparison of the tax differential, T, and the tariff rate, τ. When $T > \tau$, global net profits are maximised when P_{12} is set at a maximum. First consider the intuition for a case where $\tau = 0$. When $T > \tau$, it implies that $t_2 > t_1$. If P_{12} is set at a maximum, then $P_{12}X_{12}$, the revenue received by firm 1 (the exporter) for the transfer of X_{12} (where X_{12} is the volume of exports from firm 1 to firm 2), is higher than had P_{12} been set below the maximum. For firm 2 (the importer), the expense of purchasing X_{12} from firm 1 is higher than otherwise. Thus, π_1, the profits of firm 1, is higher than otherwise while π_2, the profits of firm 2, is lower. Since $t_2 > t_1$, the taxes paid on π_2 are lower while the taxes paid on π_1 are higher but the overall taxes paid are lower due to the tax differential. If we allow $\tau > 0$, the effect of the tariff compounds the effect of the tax differential and P_{12} set to the maximum is preferred.

When $T < \tau$ there is a preference to set P_{12} at the minimum. The intuition when $\tau = 0$ is the same as in the case when $T > \tau$. When $\tau > 0$, if $t_1 > t_2$ then $T < 0 < \tau$. The MNE wants the profits of firm 2, π_2, to be higher and the profits of firm 1, π_1, to be lower. This is achieved by setting P_{12} at a minimum since this reduces the amount paid via the tariff and takes advantage of a favourable tax differential. When $t_1 < t_2$ then $0 < T < \tau$. In this case, it is advantageous to increase π_2, implying that P_{12} should be high; with no upper limit, an infinite price would be optimal. However, when $T < \tau$, a high P_{12} raises π_2 but it also reduced π_2 because of the tariff. In this case the tariff costs outweigh the tax-differential benefits and a low P_{12} (*i.e.*, zero) is preferred.

Horst (1971) also considered imposing limits on exogenous transfer prices by assuming the government would impose the condition that $c_1 \leq P_{12} \leq P_1$. If $T < \tau$, the MNE sets $P_{12} = c_1$. If $T > \tau$, then $P_{12} = P_1$. Therefore, the transfer price will be exogenous and equal to one of the two extremes.

These theoretical results can be empirically tested. If $T > \tau$ then $t_2 > t_1$. Since P_{12} is set at a maximum, income is shifted from firm 2 to firm 1 and π_1 will be higher than otherwise. This implies that the tax liability of firm 1 will be higher and the tax liability of firm 2 will be lower. Harris *et al.* (1993) undertake empirical work that examines if the tax liability of a MNE is affected when subsidiaries are located in high- or low-tax countries. The results of this study are simply tests of the theory outlined above. If $T < \tau$ then P_{12} is set at a minimum. But, we can have $t_2 > t_1$ or $t_2 < t_1$. If $t_2 > t_1$, then income will be shifted from firm 2 to firm 1 and π_1 will be higher than otherwise and the testable hypotheses are the same as those in Harris *et al.* (1993). If $t_2 < t_1$, then the benefit from the tax differential is less than the cost of the tariff. While the tax differential will imply income shifting from firm 1 to firm 2, the impact of the tariff negates this effect and we actually see income shifting the opposite way. In this case, we will get the wrong sign on the estimated tax coefficients. We conclude that transfer pricing is not taking place even though, in the presence of a tariff, it is taking place. The tariff effect is simply determining the direction of the income shifting. While this would appear to pose a problem, there are a few factors which may limit the likelihood of this problem arising. First, many transactions for which transfer pricing can occur are service transactions which will not be subject to tariffs. Thus, the tariff effect is nil and will not pose a problem to the analysis. Second, if tariffs are positive and low, the tax differential must be even lower for $T < \tau$. For tax differentials to be lower, t_1 and t_2 need to be relatively close in size and therefore transfer pricing is not primarily motivated by tax considerations.

3-3. Copithorne (1971) model

Copithorne (1971) develops a model similar to Horst (1971) but the MNE is now vertically integrated such that firm 3 exports raw materials to firms 1 and 2 for processing and sale in the local market. In the benchmark case where there are not tariffs or corporate taxes, the global profit function is given by

$$\Pi = \left(R_1 - C_1 - P_{31}X_{31}\right) + \left(R_2 - C_2 - P_{32}X_{32}\right) + \left(P_{31}X_{31} + P_{32}X_{32} - C_3\right) \tag{3.8}$$

where P_{3i} is the transfer price charged by firm 3 for sales to firms 1 and 2.

Profits of firms 1 and 2 are equal to their revenues from selling the finished product less the costs of producing the product and the cost of the primary product. For firm 3, revenue is equal to the revenue from selling the primary product to firms 1 and 2 less the cost of producing the primary product. The transfer price charged to firms 1 and 2 can be different. Since firms 1 and 2 do not export any surplus production, it must be that $X_1 = D_1$. Global profits are constrained by

$$\begin{aligned} X_3 &= X_{31} + X_{32} \\ X_{31} &= X_1 \\ X_{32} &= X_2 \end{aligned} \tag{3.9}$$

since it takes one unit of primary product to produce one unit of finished product. Maximum global profits are found by maximising (3.8) with respect to X_1, X_2, P_{31}, and P_{32} subject to (3.9). Unlike the Horst (1971) model, the production of firms $i = 1,2$ must equal the demand of firm $i = 1,2$. Therefore, the other choice variables are the two transfer prices and not the volume of exports. Maximisation results in the following first order condition

$$r_1 - c_1 = r_2 - c_2 = c_3 \tag{3.10}$$

where $r_i - c_i$ is the net marginal revenue from producing and selling X_i.

If we introduce taxes on profits, Copithorne (1971) shows that there is no effect on output or final product prices. The corporation first finds prices and output that maximise pre-tax profits. Then a transfer price and profit target are chosen for each subsidiary such that the global profits are maximised and the global tax liability is minimised. *Ceteris paribus*, Copithorne (1971) shows that the global profit maximum is achieved when profits are allocated to the country with the lowest tax rates. Assuming as in Horst (1971) that there are government-imposed restrictions on transfer prices, the Copithorne (1971) results are comparable to the Horst (1971) results except that the Copithorne (1971) results apply to vertically integrated MNEs while the Horst (1971) model applies to horizontally integrated firms. The testable implications of the Copithorne (1971) model should be comparable to the Horst (1971) model.

3-4. Endogenous transfer prices

As previously noted, the Horst (1971) and Copithorne (1971) papers assume exogenous transfer prices since the transfer price is fixed at either the upper or lower bounds, and does not vary with output, sales, or trade levels.

Samuelson (1982) develops a model whereby the transfer price is endogenous and may not be fixed at the same boundary points as described by Horst (1971) and Copithorne (1971). In the Samuelson (1982) model a MNE consists of two corporations: firm 1, the parent, located in country 1; and firm 2, the subsidiary, located in country 2. Firm 1 produces $X = X_1 + X_{12}$ with a cost function $C_1(X)$. Quantity X_1 is sold in an imperfectly competitive market in country 1 at price $P_1(X_1)$

and revenue is $R_1(X_1)$. Quantity X_{12} is exported to a subsidiary in country 2 at a transfer price of P_{12}, and is resold in country 2 at price $P_2(X_{12})$ and revenue is $R_2(X_{12})$. In the presence of corporate taxation and tariffs, the MNE's global profits are

$$\Pi = (1-t_1)[R_1 - C_1 + P_{12}X_{12}] + (1-t_2)[R_2 - (1+\tau)P_{12}X_{12}] \tag{3.11}$$

We can rewrite (3.11) as

$$\Pi = R_1 - C_1 + R_2\Psi + [1-\Psi(1+\tau)]P_{12}X_{12} \tag{3.12}$$

where $\Psi = (1-t_2)/(1-t_1)$. Samuelson (1982) performs the maximisation of (3.12) subject to a pair of arm's-length constraints

$$\begin{aligned} P_{12} - c_1 &\geq 0 \\ P_1 - P_{12} &\geq 0 \end{aligned} \tag{3.13}$$

where c_1 is the marginal cost. The constraints impose the condition that the transfer price must be at least the marginal cost of production and no more than the market price. When $1-\Psi(1+\tau) > 0$, (3.12) implies that profits are increased by raising the transfer price and the transfer price will be set accordingly at the upper boundary of $P_{12} = P_1$. When $1-\Psi(1+\tau) < 0$, profits are maximised when the transfer price is set at the lower boundary of $P_{12} = c_1$. The conditions $1-\Psi(1+\tau) > 0$ and $1-\Psi(1+\tau) < 0$ are identical to the Horst (1971) conditions that $T > \tau$ and $T < \tau$ and follow the same intuition.

Samuelson (1982) undertakes an analysis of the implications of the desire to set either a high or a low transfer price. Maximisation of (3.12) with respect to X_1 and X_{12} is done subject to the imposition of the appropriate transfer price boundary condition outline above and specified in (3.13).

If the tax differential exceeds the tariff rate (*i.e.*, $T > \tau$), the MNE sets $P_{12} = P_1$ and changes in X_1 cause changes in P_{12}. The result is that domestic sales are smaller and exports from firm 1 to firm 2 are larger than in the exogenous transfer price case. Samuelson (1982) argues that reducing X_1 results in a higher transfer price, P_{12}. This raises π_1 and lowers π_2 which raises Π when tax differentials are taken into consideration. Further, X_{12} is increased to take advantage of the increased global profitability.

When the tariff rate exceeds the tax differential (*i.e.*, $\tau > T$), the MNE sets $P_{12} = c_1$. Decreasing X_1 and X_{12} reduces the marginal cost and relaxes the transfer price limit. A balance will be found whereby the ability to increase profits by increasing X_1 and X_{12} is offset by the decrease in profits caused by the increased marginal cost and resulting increase in the transfer price. Therefore, X_1^* decreases in order to relax the transfer price boundary. Similar result are obtained when $\tau < T$.

Samuelson (1982) then compares the effects of changes in the tariff rate and relative after-tax rates of return on X_1 and X_{12} for the endogenous and exogenous transfer price cases. In general, he finds the impact is the same when $T > \tau$ (implying $P_{12} = P_1$). When $T < \tau$, (implying $P_{12} = c_1$) the endogenous model yields ambiguous results that may differ from the exogenous model. This reflects the contradicting pressures to relax the transfer price limit when corporate taxes or tariffs change.

In the endogenous model, P_{12} will be different than in the exogenous model. However, income will be shifted in the same direction as it was in the exogenous model. This would suggest that the testable hypothesis for tax-related transfer pricing would be the same as in the exogenous model. While changes in the tax rates and tariff rate will lead to ambiguous changes to X_1 and X_{12} when $T > \tau$, it should not change the fact that the transfer price is set at the minimum, c_1, and that income are being shifted to the low-tax firm.

3-5. Uncertainty

The Horst (1971) and Copithorne (1971) models do not deal with uncertainty about exchange rates, foreign demand, and cost conditions. Batra and Hadar (1979) modify the Horst (1971) model by measuring exports in the currency of the exporting country. In this modified model, a devaluation of the home currency implies the cost of foreign production rises relative to the cost of exports, causing a reduction in X_2 and an expansion of X_{12}. With flexible exchange rates, the MNE enters the foreign exchange market and buys currency at the spot price. Batra and Hadar (1979) prove that if the spot rate exceeds the MNE's expected exchange rate, X_{12} rises compared to the level when the exchange rate is fixed. They conclude that the absence of a forward market generates uncertainty. Because of risk aversion, exports from firm 1 to firm 2 increase and more income is shifted to firm 2 compared to the case of perfect certainty. This, however, is only the case if there is no forward exchange rate market.

Das (1983) examines the effects of demand and cost uncertainties and shows that the results of changes in relative after-tax returns of the firms and changes in the tariff rates are dependent upon the MNE's measure of relative and partial relative risk aversion.[2]

3-6. References

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[2] There is a branch of the literature that examines optimal government policies. See for example, Katrak (1977, 1980), Bond and Samuelson (1989), and Elitzur and Mintz (1996). We do not review this literature because, although important, it does not have a direct bearing on our work.

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CHAPTER 4
TRANSFER PRICING AND THE INCOME SHIFTING BEHAVIOUR OF MULTINATIONAL ENTERPRISES

4-1. Introduction

International taxation issues are becoming more important in an ever growing global economy. Since tax rates are not constant across countries, the global tax liability of a MNE will depend upon where foreign subsidiaries are located and the tax rates that these subsidiaries face. A MNE will prefer to report taxable income in a jurisdiction that has a lower tax rate, thus creating an incentive for the MNE to shift income from high-tax to low-tax jurisdictions. While global taxable income is unchanged, the global tax liability is reduced.

For a capital importing and exporting country such as Canada, the taxation of MNEs is an important issue. There are three principal methods of taxing foreign-source income. In ***accrual taxation***, the home country taxes the foreign-source income of a MNE's foreign subsidiary when the income is earned, regardless of whether or not the income is repatriated. This method is used by most countries for the taxation of the income of a foreign branch of the MNE when a foreign subsidiary has not been created. The ***exemption*** of foreign-source income is the second approach. In this case, the income of the foreign subsidiary is excluded, either fully or partially, from the MNE's taxable income at home.

The final method of taxation is ***deferral taxation***. Here the foreign income of a foreign subsidiary is taxed by the home country only when the income is repatriated, or deemed to have been repatriated. This method is most common in large capital-exporting countries, such as the United States. Retained earnings under the deferral system are only taxed by the home country upon repatriation. Therefore, incentives exist for the MNE to hold financial assets in a foreign subsidiary located in a low-tax jurisdiction. When this is done, the income from the financial assets can be kept in the low-tax jurisdiction, thus never being subject to taxation by the home country since the income is never repatriated.

To eliminate these tax-avoidance practices, the home country can adopt passive-income provisions. The income from these financial assets is called ***passive income*** (or ***tainted income*** in some jurisdictions such as the US) because it is generated by simply holding an investment and is not generated from active business operations. These provisions are intended to prevent MNEs from diverting or accumulating income in a foreign subsidiary to avoid home tax liabilities. Passive income earned by a foreign subsidiary is deemed to be income of the MNE when it is earned by the foreign subsidiary and is immediately subject to home taxation. It is as if the foreign subsidiary repatriated the income and the parent then provided the foreign subsidiary with an equity injection of the after-tax income, which was then reinvested in the financial asset. Examples of passive income include income from property and from investment-type businesses, certain capital gains, and certain business income derived from home sources; it does not include sales and services income.

One way income can be shifted is for one foreign subsidiary to purchase tangible goods or intangible goods and services from another foreign subsidiary of the MNE. The price associated with this transaction is referred to as the ***transfer price***. Transfer pricing is a completely legal and necessary activity for a MNE. The transfer price is supposed to be equal to the price that would be charged if the two subsidiaries were operating at an arm's length. However, it may be very difficult to determine this price, particularly for transactions that involve intangible products such as a drug patent. There are several acceptable methods of determining the arm's-length price such as comparable uncontrolled pricing or cost-plus pricing. While there are preferred methods that are dependent upon the circumstances of the transaction, these methods can arrive at significantly different prices, and the MNE could benefit if one method is chosen over another.

For many years, there has been an awareness that MNEs can evade a large portion of their statutory tax burden through the manipulation of transfer prices on cross-border charges.[1] With the globalisation of the economy, more corporations are becoming multinational in nature. There has been an increased interest in the behaviour of MNEs since transfer price manipulation can result in more significant revenue impacts for governments. The MNE's profits attributed to one country can be increased or decreased depending upon the transfer price used. This affects the taxable income of the MNE and therefore affects the amount of taxes collected by each government.

Why may a MNE wish to manipulate transfer prices? Weichenrieder (1996a) points to three reasons. First, there may be a desire to manipulate transfer prices due to the existence of tariffs on intra-firm trade. If tariffs are based on the price of a commodity, choosing a low transfer price can provide a tax savings. Second, differences in corporate tax rates across countries may create incentives for transfer price manipulation. If a foreign subsidiary is located in a relatively high-tax jurisdiction, setting high transfer prices for purchases by the foreign subsidiary from a parent can increase global profits. While global taxable income is unchanged, the taxable income of the foreign subsidiary is lowered due to increased expenses. The tax savings of the foreign subsidiary exceeds the additional taxes paid by the parent on the taxable income shifted from the foreign subsidiary. These two reasons have received attention, most notably by Horst (1971), Copithorne (1971), and Itagaki (1979, 1991) and Kant (1988, 1990).

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[1] Since there is some flexibility in the methodology used to determine a transfer price, we use the term ***manipulation*** to refer to the use of *legal* transfer pricing practices where the MNE chooses to manipulate the transfer price to its advantage. This is compared to ***abuse*** which would refer to *illegal* transfer pricing practices.

A third reason for using transfer price manipulation to shift profits arises when the foreign subsidiary's profits are subjected to double taxation. The income of a foreign subsidiary is subject to taxation by the host country. When profits are distributed to the parent corporation, the income will be subjected to taxation on by the home country. If a credit is provided by the home country for foreign taxes paid on the income the double taxation is avoided. However, if a deduction system is used, double taxation will occur. Also, home countries that use a credit system usually provide a credit with limitation. The credit for foreign taxes paid is limited to the total home tax liability on that income; surplus credits are non-refundable causing some degree of double taxation to occur.

In this chapter, we model the income shifting behaviour of the MNE. We develop a model that incorporates the ability to shift income across borders between entities of the MNE. We assume the parent is located in a country such as the United States so the model incorporates the use of deferral taxation on income earned by the foreign subsidiary and the ability of the parent to claim a credit, with limitation, for foreign taxes paid on distributed income.

The model explains how the MNE may shift income to reduce its global tax liability by taking advantage of differences in corporate tax rates across countries. The optimal financial policy is determined given this tax planning behaviour. We also find an expression for the user cost of capital which can be used to calculate the gross rate of return on investment by a MNE in a foreign subsidiary, and subsequently, the marginal effective tax rate of that investment.

We find that a MNE that is in a surplus foreign tax credit position will use cross-border charges to shift as much income as possible to the parent, thus reducing the global tax liability. When the MNE is in a deficit foreign tax credit position, as much income as possible will be shifted to the foreign subsidiary, or the MNE will try to minimise the transfers from the foreign subsidiary to the parent corporation.

An interesting result from our model involves the effect on the user cost of capital when there are changes in the host country corporate income tax rates when the MNE is in a surplus foreign tax credit position. Since the surplus foreign tax credit case suggests the MNE will shift income through cross-border charges to the parent corporation, an increase in the host-country tax rate only increases the tax liability on the income that is not shifted. However, the foreign subsidiary is allowed to claim deductions for interest expenses and depreciation to reduce the host-country tax liability. When the host-country tax rate increases, these deductions are more valuable. If enough income is shifted to the parent corporation, the increased deductions can more than offset the extra tax liability on the income that remains in the host country. The user cost of capital can actually *decrease* when the host country increases its tax rate. This suggests that once a MNE decides to locate in a country, increases in the host-country tax rate actually could be beneficial to the MNE as the user cost of capital will decline if enough income can be shifted through cross-border charges to the parent corporation.

The remainder of this chapter is outlined as follows. In section 4-2 we provide a brief summary of the related theoretical literature. Section 4-3 is where we introduce a new model of the behaviour of the MNE where the transfer-pricing behaviour of the MNE is explicitly specified. The model provides us with predictions about the financial behaviour of the MNE along with an equation for the user cost of capital. The solution to the model is provided in section 4-4. In section 4-5 we undertake a brief comparative statics analysis. Finally, we summarise our results in section 4-6. Appendix 1 provides more mathematical detail on the derivation of the equations in the model.

4-2. Related theoretical literature

There are several different branches to the literature on transfer pricing. The first branch examines the investment behaviour of the MNE. Emphasis is given to the impact of international taxation on the investment financing decisions of the foreign subsidiary. The seminal paper by Hartman (1985) is summarised below. In addition, Leechor and Mintz (1993) develop a more detailed model whose results contradict Hartman (1985).[2] Weichenrieder (1996b) expands on several previous works by incorporating the different tax treatments of passive and active business income, contradicting the Hartman (1985) findings. Only Weichenrieder (1996a) provides a theoretical model that specifically addresses cross-border charges, also refutes the Hartman (1985) findings.

The second branch of the transfer-pricing literature examines the marginal effective tax rate (METR), which has typically focused on a closed-economy model (domestic investment by a domestic firm). Some attention is given to open-economy models and the role of international tax issues.[3] In the third component of the transfer-pricing literature, an equation for the user cost of capital is derived by modelling the behaviour of the MNE. Using this equation and aggregate data along with assumptions about some variables the user cost of capital is calculated and the METR determined. Leechor and Mintz (1991) is one such study. They focus on Thailand, a capital-importing country, and utilise the model developed in Leechor and Mintz (1993). One benefit of this study is that it incorporates a relatively detailed model of the behaviour of the firm when determining the user cost of capital.

Our research draws on work from this third branch of the transfer-pricing literature and the literature on the investment behaviour of the firm. Therefore, as in Leechor and Mintz (1993), international tax considerations are important. Unlike

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[2] We note that the Hartman (1985) result can be derived from the Leechor and Mintz (1993) model under some restrictive assumptions on some variables.

[3] See for example, Boadway, Bruce, and Mintz (1984) and Mintz and Tsiopoulos (1994).

Leechor and Mintz (1993), we incorporate the transfer pricing behaviour in a manner similar to Weichenrieder (1996a), but expand the Weichenrieder (1996a) model to allow for debt financing and capital depreciation provisions. In addition, we incorporate both home and foreign tax rates into the model rather than simply using an effective tax rate that ignores the underlying tax rates. Before developing the model, we provide a more detailed summary of the related literature.

4-2.1. Hartman (1985)

Hartman (1985) concludes that investment decisions of a foreign subsidiary are independent of the home country's tax system when retained earnings are used to finance further operations of the foreign subsidiary and excess retained earnings (*i.e.*, those not used for reinvestment) are repatriated to the parent corporation.

It was generally believed that a country's taxation of foreign source income under deferral taxation affected the foreign subsidiary's investment decision. For example, Horst (1971) undertakes one of the first thorough investigations of the taxation of MNEs and the issue of double taxation. Hartman (1985) focuses on the US system of taxing the repatriated earnings of MNEs. He suggests the home country's tax rate on foreign-source income should be irrelevant to a mature foreign subsidiary's investment decision under deferral taxation, thus contradicting the general belief that home-country tax rates matter. However, as Hartman (1985) notes, Horst (1971) ignores the future liability to the home country on profits retained by the foreign subsidiary, and the payment of dividends to the parent is exogenous and thus unaffected by the firm's desire to invest additional funds in the foreign subsidiary.

Hartman (1985) incorporates the role of present and future tax liabilities and endogenises the dividend decision. The model does not include any provisions for debt. The repatriation of profits and not the earning of those profits becomes the source of the tax liability under the deferral method. Thus, the home corporate tax liability on foreign-source income can be thought of as a tax on the transfer of funds to the parent. In this set-up, Hartman (1985) suggests the home tax on foreign-source income could have very different effects from the home tax on domestic income and could be highly dependent upon the transfer of funds involved in the marginal foreign investment. A distinction is also made between immature foreign operations (*i.e.*, relatively new foreign investments) and mature foreign operations (*i.e.*, those which do not require capital injections from the parent). The reasons for this distinction is discussed below.

A few key results need to be discussed. First, Hartman (1985) shows that there is a difference between mature foreign operations, which at the margin are deciding to reinvest retained earnings versus paying dividends to the parent, and immature foreign operations, which at the margin are investing funds transferred from the parent. The existence of a tax on the transfer of funds from the foreign subsidiary to the parent should induce the MNE to avoid unnecessary transfers. Instead of repatriating income followed by injecting more capital into the foreign subsidiary, the parent is better off directly reinvesting retained earnings. While this result may seem obvious, Hartman (1985) notes that it calls into question some earlier discussions that presume the parent repatriates income and then reinvests it in the foreign subsidiary. Perhaps the reason for this previous discussion relates to the aggregate data which shows substantial dividend payments and equity injections taking place at the same time. One explanation for this stylised fact is that some subsidiaries are paying dividends while others receive equity injections but few, if any, do both. Upon aggregation, the distinction is lost.

The next result in Hartman (1985) is the most significant. He shows that the home country's rate of tax on foreign-source income and the presence or absence of foreign tax credits should be irrelevant to a mature foreign subsidiary's investment decision under deferral taxation. Also, the repatriation of profits should be unaffected by the tax treatment of foreign-source income. To see how this is possible, consider the following analysis.

Suppose that a mature foreign subsidiary has one dollar of after foreign-tax earnings. Let τ^* be the host-country tax rate and τ be the home-country tax rate. Assume that $\tau > \tau^*$. The dollar of after-foreign tax earnings can be reinvested by the foreign subsidiary or repatriated to the parent. First consider the case where the dollar is repatriated as a dividend. Although the dividend is paid from the after-tax income of the foreign subsidiary, the home government taxes the before-tax (gross) value of the dividend and provides a credit for foreign taxes paid. The gross dividend is $1/(1-\tau^*)$. Since $\tau > \tau^*$, the home-country tax rate on the dividend is $(\tau - \tau^*)$ as a credit is provided for the foreign taxes paid. The total tax paid to the home country on the dividend is $(\tau - \tau^*)/(1-\tau^*)$ which leaves $(1-\tau)/(1-\tau^*)$ remaining. This amount can be reinvested for one period at a rate of r_n, the net-of-tax return available in the home country. At the end of the period, the parent has $[(1-\tau)/(1-\tau^*)](1+r_n)$.

Alternatively, the foreign subsidiary could reinvest the dollar and repatriate $1 + r^*(1-\tau^*)$ to the parent at the end of the period, where r^* is the host country before-tax return on the investment. Upon repatriation, the parent must pay home-country taxes on the gross dividend and a credit for foreign taxes paid can be claimed. In this case, the parent now has, net of tax, $[(1-\tau)/(1-\tau^*)][1 + r^*(1-\tau^*)]$.

Comparing the two outcomes, we can see that the MNE will be indifferent between reinvesting and repatriation profits if $r^*(1-\tau^*) = r_n$. The home country deferral system induces the MNE to invest abroad up to the point at which the foreign after-tax return, $r^*(1-\tau^*)$, equals the domestic after-tax return, r_n. Note that the domestic tax applied to foreign-source income plays no role in the firm's marginal investment decision; the firm behaves as it would if the home country did not tax foreign source income.[4] This implies the US tax system provides capital import neutrality: the same tax rates are influencing decisions of both host country firms and foreign investors in the host country. Following the same approach as above, Hartman (1985) also shows that the neutrality result holds when a deduction rather than a credit is provided for foreign taxes paid. The results that the home country's tax rate on foreign-source income and the presence or absence of a foreign tax credit should be irrelevant to a mature foreign subsidiary's investment and dividend repatriation decision was contrary to the conventional wisdom of the time and have become known as the ***Hartman neutrality*** result.[5]

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[4] The home country tax rate will affect the domestic after-tax return but the tax rate is now being applied to domestic-based income and not foreign-based income.

Hartman neutrality does not apply to immature foreign subsidiaries. Unlike mature subsidiaries, tax changes should alter the investment behaviour of immature subsidiaries, in particular because the source of funds for the marginal investment is equity injections from the parent rather than retained earnings. The future payout of dividends is now affected by the home tax rate with the exact effect depending upon the timing of the deferred tax payments.

4-2.2. Leechor and Mintz (1993)

Leechor and Mintz (1993) undertake to provide a formal treatment of the impact of deferral taxation on the cost of capital for mature subsidiaries of MNEs but they do not examine the role of transfer pricing in determining the foreign subsidiary's income. They show that the MNE's capital decision is affected by both home and host country taxes, even when retentions and local debt are used to finance investment. The intuition is that the foreign subsidiary's capital stock and debt decisions affect corporate taxes owing on dividends when repatriated to the home country. The results are based on the assumption that the parent corporation pays at least some tax on remitted income to the home country.

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[5] It is sometimes referred to as the Hartman-Sinn neutrality result as Sinn (1984) put forth a similar argument in independent work.

The Leechor and Mintz (1993) model examines a wholly-owned foreign subsidiary of a MNE where the home country taxes the income of the foreign subsidiary on the deferral basis. The model assumes capital is financed by retained earnings or local debt; equity injections by the parent corporation are excluded for simplification. The model takes inflation into account and specifically defines the total corporate taxes paid on repatriated dividends (*i.e.*, the home and host country tax rates and the foreign tax credit are included rather than lumping them together as one term). In addition, the model is more detailed than previous work in that it incorporates capital cost allowances, and not only provides for differing home and host capital cost allowance rates, but also allows for differences in the tax definition of capital in each country.

The MNE's problem is to maximise the value of the firm (the MNE's equity in the foreign subsidiary). The interior solution to this problem is the equation for the user cost of capital, expressed as

$$f'(K)=\frac{\left(\delta+\frac{\rho}{1-c}-\pi\right)}{1-\bar{\tau}}(1-A) \tag{4.1}$$

where δ is the exponential rate of economic depreciation of capital, ρ is the discount rate of the parent corporation, and c is the capital gains tax that is paid by the parent on its equity holdings in the foreign subsidiary. The capital gains tax rate is an effective tax rate since capital gains are only realised when the assets are sold; here the capital gains accrue each year, even if the assets are not sold. The home rate of inflation is π. The effective tax rate on repatriated income is $\bar{\tau}$ and A represents the effect of the capital cost allowance granted by the host country (explained below).

The interpretation of (4.1) is as follows. The parent incurs the depreciation costs, δ. It also incurs the real financing costs, which is measured by the opportunity cost of equity financing adjusted by the home-country inflation rate, $\rho/(1-c)-\pi$. In addition to being taxed at the host country's corporate tax rate, the net revenues earned by the foreign subsidiary are subjected to additional taxes by the home government upon repatriation. The effective tax rate, $\bar{\tau}$, is thus the host-country tax rate plus the additional repatriation taxes imposed by the home country when dividends are remitted. This last component is simply the home country tax rate, τ, less the host country tax rate, less any foreign tax credits that can be claimed. The final term in (4.1), $(1-A)$, is the present value of the capital cost allowance granted by the host country.

The Leechor and Mintz (1993) results show that the cost of capital of the foreign subsidiary depends upon the difference between host and home country statutory tax rates and not average tax rates. They note that even in the case of surplus foreign tax credits, the cost of capital will depend on the repatriation tax, provided the tax credits are used against taxes on other sources of income from other subsidiaries. The use of surplus foreign tax credits against other sources of income is called ***cross crediting***. In the United States, cross crediting is permitted in some cases. If one foreign subsidiary uses more capital, it increases the value of the foreign tax credits and, with cross crediting, reduces the amount of tax owing on other forms of income, thus contributing to a lower cost of capital.

4-2.3. Weichenrieder (1996b)

Weichenrieder (1996b) examines the passive-income approach under the deferral system of taxation to determine its impact on the international allocation of capital. Intra-firm debt is ignored in the model as is the transfer pricing problem. The model follows the framework of Sinn (1991a,b; 1993) and Hines (1994). The model takes into account the fact that the foreign subsidiary may invest retained earnings in portfolio investments in the capital market in addition to investing retained earnings internally. This feature is essential for the model since the portfolio investments will be the basis for the passive income.

It is assumed that the home tax rate is higher than the foreign tax rate on retained earnings. This assumption ensures the foreign subsidiary will undertake the portfolio investments on behalf of the MNE. If the home tax rate were lower than the foreign tax rate, then portfolio investment would be undertaken by the parent since the tax liability on the income earned on the portfolio investment would be lower. Let the effective tax rate on the foreign subsidiary's distributed profits be $\bar{\tau}'$, reflecting the fraction, $(1-\bar{\tau}')$, of distributed foreign profits that the parent receives. This tax rate is an effective rate since double-taxation can result in $\bar{\tau}'$ depending upon both the home and host country corporate tax rates and any withholding taxes that are collected by the host country.

When dividend repatriation occurs, it is useful to distinguish between dividends paid out of active and passive investment income. Since passive income is treated as if it had been distributed as a dividend and subsequently reinvested, it is assumed that the MNE immediately repatriates all earnings from passive investments. This treatment of passive income is consistent with FAPI rules in Canada. The result is that passive income is immediately subject to home-country taxation; deferral is not permitted.

The MNE maximises the discounted value of the net repatriations of the foreign subsidiary. The foreign subsidiary is allowed to earn pure rents so the production function of the foreign subsidiary is $f(K)$ with $f'(K)>0$ and $f''(K)<0$. The four control variables are repatriations from active business income, R, gross investment, I, which equals net investment by assuming no depreciation, the stock of debt of the foreign subsidiary, B, and additional equity injections by the parent, Q. Passive income is defined as $D=i(X+B-K)$ where X is equity, K is real capital, and i is the return on the investment (assumed to be the world interest rate). This income is assumed to be repatriated immediately and taxed at the rate ϕ, where $\phi=\max\{\tau,\bar{\tau}'\}$

where τ is the home-country tax rate. The proceeds are then reinvested in the foreign subsidiary. Active income is taxed by the home country under the deferral system.

The problem for the MNE is to maximise the value of its equity investment in the foreign subsidiary. Assuming an interior solution, Weichenrieder (1996b) finds that the profit maximising investment condition is

$$f'(K)=\left(\frac{1-\tau}{1-\tau^*}\right)i<i \text{ since } \tau>\tau^* \tag{4.2}$$

where τ^* is the host-country statutory tax rate and τ is the home-country statutory tax rate; i is the market rate of interest. Since the marginal product of capital falls short of the market rate of interest, the foreign subsidiary will not find it attractive to finance its marginal investment with debt; retained earnings are strictly preferred. While the parent is indifferent between injecting and not injecting additional capital, the foreign subsidiary will never repatriate retained earnings; the higher tax burden on repatriated earnings discourages repatriation. The retained earnings will always be reinvested in the foreign subsidiary. Therefore, only passive income is repatriated or is deemed to have been repatriated and then re-injected into the foreign subsidiary as equity from the parent.

An alternative to the passive-income approach is to impose a restriction on the amount of passive income a foreign subsidiary is permitted to have relative to active income. The example used by Weichenrieder (1996b) is the US provisions for foreign personal holding companies. When passive income of a foreign subsidiary exceeds 75 percent of total profits or 50 percent or more of its assets produce passive income, the firm is subject to immediate US taxation for both types of profits. Imposing such a restriction on the MNE, Weichenrieder (1996b) finds the marginal product of capital to be

$$f'(K)=\frac{\left(\frac{1-\tau}{1-\tau^*}\right)}{1+v\left(\frac{\tau-\tau^*}{1-\tau}\right)}i \tag{4.3}$$

where v is the ratio of passive income to active income. Equation (4.3) can be interpreted as follows. As the ratio v increases, $f'(K)$ decreases because an additional dollar of real investment brings about additional active investment income and thus eases the restriction on the amount of passive income permitted, which helps to defer taxes.[6] Note that if $v = 0$, then (4.3) simplifies to be the same as (4.2).

4-2.4. *Weichenrieder (1996a)*

Weichenrieder (1996a) specifically models the transfer pricing behaviour of the MNE to focus on the third reason why a MNE may engage in transfer pricing manipulation: income shifting due to double taxation. As mentioned earlier, this double taxation can occur when the home country provides a deduction and not a credit for foreign taxes paid. Double taxation also occurs when a credit with limitation is provided for foreign taxes paid. A reduction in double taxation would seem to lower the MNE's cost of capital and encourage international investment. However, as noted above, work by Hartman (1985) and Sinn (1984) found that the rate of dividend taxation may be irrelevant to the size of foreign investment if the foreign subsidiary is financed by retained earnings.

Unlike previous studies of the taxation of the MNE, Weichenrieder (1996a) incorporates transfer pricing activity into the model. The important result of this paper is that the Hartman neutrality condition may not hold when the MNE is able to shift profits between entities through transfer price manipulation. Weichenrieder (1996a) shows that an increase in the tax rate on foreign dividends (such as through a withholding tax by the host country or an increase in the corporate tax rate by the home country) may lead to a lower cost of capital for the foreign subsidiary. Weichenrieder (1996a) also notes that Hartman neutrality is predicated on the assumption that dividend taxes cannot be evaded. However, if marginal profits can be shifted from the foreign subsidiary, income is shifted to the parent corporation, dividends can be reduced, and double taxation is reduced.

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[6] Weichenrieder (1996b) notes that v cannot increase to infinity as the transversality condition for the problem will not hold.

Intra-firm trade is not specifically modelled since the impact of taxes and transfer pricing on trade patterns depends heavily on the assumption about whether the parent or the foreign subsidiary is the exporter. To avoid this problem, Weichenrieder (1996a) assumes that the transfer price manipulation is done with intangible goods and not on intra-firm trade.

Weichenrieder (1996a) assumes that the MNE is not free to shift any desired amount of income between entities. There are two reasons for this assumption: reasons internal to the firm and restrictions by tax authorities. From an internal standpoint, Caves (1982) suggests that distorted transfer prices may provide the wrong signals to profit centres and may reduce efficiency. Also, it seems reasonable that the tax authority would not allow transfer price manipulation to lead to a sustained period of losses for a foreign subsidiary of the MNE. While a foreign subsidiary could have legitimate (non-transfer price manipulated) losses, the existence of sustained losses would send a signal to the tax authority that transfer price manipulation may have been undertaken. This signal increases the likelihood that the tax authority would audit the entity and closely examine the transfer pricing methodologies. The audit would be costly to the MNE because of the manpower required to satisfy the tax authority that no manipulation had occurred, and because of the penalties (*e.g.*, recalculation of the tax liability, punitive or late-payment penalties, and interest charges) that may be imposed if the tax authority found undue manipulation had occurred. The MNE will want to set a transfer price whereby the tax benefits exceed the expected penalty if caught.[7] For both internal and tax authority restrictions, the MNE may not want to shift all profits. As such, the foreign subsidiary may end up shifting only a fraction of the true profits to the parent.

Weichenrieder (1996a) models the behaviour of a parent and a wholly-owned foreign subsidiary. Assuming the home country adopts the deferral method of taxation, the home country does not tax the profits of the foreign subsidiary until the profits are repatriated. When profits are repatriated through dividend payments to the parent the tax rate on those profits is different compared to the tax rate on domestic profits. Repatriated profits are subject to corporate taxation by the host government, withholding taxes when repatriated, and taxation by the home government (which may include some provisions for credits for foreign taxes paid on the repatriated profits). Weichenrieder (1996a) assumes that the tax rate on repatriated profits exceeds the tax rate on retained earnings due to some degree of double taxation, and the tax rate on the repatriated profits also exceeds the home country's corporate tax rate. This assumption results in a preference for using transfer price manipulation to shift profits to the parent over repatriating the same profits through dividends.

The parent endows the foreign subsidiary with some amount of initial capital. Future financing is provided by equity injections from the parent or retained earnings of the foreign subsidiary; borrowing is excluded by assumption. To incorporate the ability to shift profits through transfer pricing, the foreign subsidiary is taxed on ***reported profits*** which are gross profits less profits shifted through transfer pricing activities. In line with the discussion about the ability to transfer all profits to the parent through transfer pricing activities, Weichenrieder (1996a) imposes a restriction that only a fraction of gross profits can be shifted through transfer pricing.

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[7] There are several acceptable means of calculating transfer prices, each of which can result in significantly different reported profits for the MNE. Refer to section 2-3 for more details.

The MNE's problem involves the parent being indifferent between keeping the foreign subsidiary or selling it. The solution to the model involves maximising the value of the firm (the flow of net dividends plus net shifted profits less equity injections).

In the Weichenrieder (1996a) model, the user cost of capital is

$$f'(K) = \frac{i}{\frac{\beta(1-\tau^*)}{(1-\bar{\tau}^*)} + \frac{(1-\beta)(1-\tau^*)}{(1-\tau)}} \tag{4.4}$$

where β is the fraction of gross profits that can be shifted through transfer pricing, and τ^* and τ are the host- and home-country corporate tax rates. The tax rate applied to dividends repatriated from the foreign subsidiary is $\bar{\tau}^*$. Weichenrieder (1996a) does not explicitly define $\bar{\tau}^*$, although it will be a function of τ and τ^* along with any withholding taxes that may apply to dividend repatriations. Due to the assumption of some degree of double taxation in the model, $\bar{\tau}^* > \tau$.

Equation (4.4) can be explained as follows. Assume the parent's net-of-tax dividend was reduced by one dollar. The foreign subsidiary is therefore able to invest an additional $(1-\tau^*)/(1-\bar{\tau}^*)$ which yields a gross return of $f'(K)(1-\tau^*)/(1-\bar{\tau}^*)$. The MNE can then repatriate β of the gross profits via transfer pricing, leaving $\beta(1-\tau)f'(K)(1-\tau^*)/(1-\bar{\tau}^*)$ after home-country taxes are applied. The parent corporation also receives the remaining profits from the foreign subsidiary in the form of dividends, which are taxed, leaving $f'(K)(1-\beta)(1-\tau^*)$ as the funds available to pay the net of tax dividend to the parent corporation. In arbitrage equilibrium, the sum of these net benefits will equal the net rate of return $i(1-\tau)$, which can be rearranged to derive the user cost of capital in (4.4). Note that when no shifting of profits through transfer pricing is possible, $\beta = 0$, and (4.4) reduces to (4.2).

Weichenrieder (1996a) shows that new equity injections are not optimal and that a reduction in dividend payments is the optimal source of finance (*i.e.*, use retained earnings). Since dividends are taxed at a higher rate, $\bar{\tau}^{*} > \tau$, the parent foregoes fewer after-tax profits if the foreign subsidiary reduces dividends instead of reducing profit shifting.

Weichenrieder (1996a) shows that in a steady state where dividends are paid by the foreign subsidiary a sufficient condition for an increase in the dividend tax rate $\bar{\tau}^{*}$ to lower the cost of capital and to increase the foreign subsidiary's steady-state capital stock is for $\beta > 0$ (*i.e.*, some portion of profits are shifted). Why is this the case? Consider an increase in $\bar{\tau}^{*}$. This has asymmetric effects on the cost of funds on the one hand and on the use of profits on the other. A larger $\bar{\tau}^{*}$ increases the investible funds if the parent foregoes $1 of net dividends, so the opportunity cost of retentions declines. While future net dividends decline, this is not the case for those profits repatriated by transfer pricing and which are not subject to $\bar{\tau}^{*}$. In total, the cost of funds becomes cheaper due to more than one option for the use of profits; profits can be repatriated through dividends or through the use of cross-border charges. The larger the value of β, the larger the impact of a change in $\bar{\tau}^{*}$ on the equilibrium capital stock. If $\beta = 1$ then this result will not hold as dividend repatriations are nil and a corner solution must be applied.

The surprising result is that Weichenrieder (1996a) suggests that withholding taxes can promote foreign investment if firms can shift some fraction of their foreign profits and if the marginal source of finance is a reduction in ordinary dividend payments.

4-3. A model of the behaviour of a multinational enterprise

We examine the income shifting behaviour of the MNE by developing a model that incorporates the ability to shift income across borders between entities of the MNE. The model explains how the MNE may shift income to reduce its global tax liability by taking advantage of differences in corporate tax rates across countries. The optimal financial policy is determined given this tax planning behaviour. We also find an expression for the user cost of capital which can be used to calculate the gross rate of return on investment by a MNE in a foreign subsidiary, and subsequently, the marginal effective tax rate of that investment.

Consider a MNE that consists of a domestically-based parent and a wholly-owned foreign subsidiary. We define the host country as the country where the foreign subsidiary is located, and the home country refers to the country where the parent is located. The home country taxes the world-wide income of the MNE. However, taxes on income earned through a foreign subsidiary are deferred until the income is repatriated to the home country. Assume the foreign subsidiary is mature, implying it has passed the start-up phase of development. For this reason, we assume the parent does not need to provide equity injections to the foreign subsidiary as future operations can be financed by using retained earnings or by issuing new debt.

Let $f(K_t^*)$ be the true revenues of the foreign subsidiary. The true revenues are those revenues associated with the foreign subsidiary's operations without income shifting, as if the foreign subsidiary was operating as a stand-alone entity. Since we are concentrating on the capital investment decision, we suppress, with no loss of generality, all other arguments of the production function. Alternatively, we could assume the technology used by the foreign subsidiary requires only capital. Let $f(K_t^*)$ be strictly concave defined over the capital stock so that $f'(K_t^*) > 0$ and $f''(K_t^*) < 0$.

The MNE may find it advantageous to shift income between the foreign subsidiary to the parent through cross-border charges, C_t^*. To simplify, we assume these transfers are associated with intangible goods so that tariffs can be ignored. We do not impose any restriction on the value of C_t^*. Therefore, if $C_t^* > 0$, cross-border charges are being used to shift income from the parent corporation to the foreign subsidiary. If $C_t^* < 0$, then income is shifted to the parent from the foreign subsidiary. It is likely that there will always be some transactions in each direction. We therefore consider C_t^* to be the net cross-border charges.

The income for tax purposes as reported by the firm will be $f(K_t^*)-C_t^*$. In period t, the foreign subsidiary makes net investment of $K_t^*-K_{t-1}^*$ and replacement investment on depreciated capital of $\delta^* K_{t-1}^*$ where δ^* denotes the rate of economic depreciation of capital. The foreign subsidiary finances capital with retained earnings from the previous period plus new issues of bonds. The new issues of bonds is simply the difference between the stock of debt, $B_t^*-B_{t-1}^*$. Interest on the stock of bonds is equal to iB_{t-1}^* where i is the interest rate. For simplicity, the interest rate is assumed to be constant over time.

The stream of dividends for the foreign subsidiary is

$$D_t^* = f(K_t^*)-C_t^*-(K_t^*-K_{t-1}^*)-\delta^* K_{t-1}^*+B_t^*-B_{t-1}^*-iB_{t-1}^*-T_t^* \qquad (4.5)$$

The dividend-stream specification is similar to Leechor and Mintz (1993) except for the incorporation of cross-border charges and the fact that Leechor and Mintz (1993) use continuous time in their model.

The foreign subsidiary's host-country corporate tax liability, T_t^*, depends upon the institutional tax regime in effect. Taxable income is total revenues as reported for tax purposes, $f(K_t^*)-C_t^*$ with deductions for interest payments and the depreciation of capital. Both central and state government corporate tax rates are applied to the taxable income. For simplicity, we use a combined central-state tax rate. In addition to corporate income taxes, central and state government capital taxes are applied to the corporation's total capital. An investment tax credit, ϕ^*, is also provided for new investment undertaken in time t. This tax credit is the combined central and state government effective investment tax credit rate provided for gross investment.[8] We combine the two capital taxes into one tax rate. The corporate tax liability of the foreign subsidiary is

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[8] This is an effective tax credit rate because governments do not necessarily allow all research and development expenditures to be eligible for the investment tax credit.

$$T_t^* = \tau^* \left[f\left(K_t^*\right) - C_t^* - iB_{t-1}^* - \alpha^* \hat{K}_t^* \right] + \tau^{k^*} K_t^* - \phi^* \left(K_t - K_{t-1}^*\right) \tag{4.6}$$

where τ^* is the combined central and state government effective tax rate on taxable income, τ^{k^*} is the combined central and state government tax rate on capital, α^* is the capital cost allowance (which is not necessarily equal to δ^*), and $\hat{K}_t^*$ is the undepreciated capital cost base for tax purposes (*i.e.*, the book value of the undepreciated capital).

Unlike Leechor and Mintz (1993) and Weichenrieder (1996a), we incorporate capital taxation.[9] We also allow for investment tax credits as was done and unlike Weichenrieder (1996a), we allow the foreign subsidiary to issue debt; equity injections are ignored as we assume the foreign subsidiary is mature and there is no need for these injections. This assumption is consistent with Weichenrieder (1996a) who finds the parent will not provide new equity injections when given the choice between financing new capital investment by equity or retained earnings. Weichenrieder (1996a) also ignores the specification of tax rates by assuming that income from the foreign subsidiary faces an effective tax rate that incorporates all domestic and foreign corporate taxes, including withholding taxes. As discussed below, we specify separate domestic and foreign corporate taxes and withholding taxes in our model.

The undepreciated capital cost base, $\hat{K}_t^*$, is equal to the remaining amount of undepreciated investment expenditures accumulated in previous years plus any additions to the capital stock in period t, taking into account any investment tax credits received. This can be expressed as

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[9] We note that Mintz and Tsiopoulos (1994) incorporate investment tax credits in their model of multinational investment with repatriated dividends.

$$\begin{aligned}\hat{K}_t^* &= (1-\alpha^*)\hat{K}_{t-1}^* + (1-\phi^*)(K_t^* - K_{t-1}^*) + (1-\phi^*)\delta K_{t-1}^* \\ &= (1-\alpha^*)\hat{K}_{t-1}^* + (1-\phi^*)K_t^* - (1-\phi^*)(1-\delta^*)K_{t-1}^*\end{aligned} \tag{4.7}$$

This expression incorporates the fact the tax depreciation system is based on the original cost of the asset. It also takes into account the depreciation base for tax purposes may be smaller than actual investment since an investment tax credit may be claimed.

Substituting (4.6) into (4.5) yields

$$\begin{aligned}D_t = {} & (1-\tau^*)\left[f(K_t^*) - C_t^* - iB_{t-1}^*\right] + (B_t^* - B_{t-1}^*) + \tau^*\alpha^*\hat{K}_t^* - \\ & \left[1-\phi^* + \tau^{k^*}\right]K_t^* + (1-\phi^*)(1-\delta^*)K_{t-1}^*\end{aligned} \tag{4.8}$$

4-3.1. Income shifted by the foreign subsidiary and received by the parent

In addition to the flow of dividends from the foreign subsidiary to the parent corporation, the MNE may shift income between the parent and the foreign subsidiary in the form of cross-border charges. These cross-border charges may consist of interest payments, royalty and licensing payments, or other payments such as administrative and management fees.

As we saw in the dividend formulation, cross-border charges from the foreign subsidiary to the parent reduce the amount that is available for repatriation through dividends since the income has already been repatriated in another form. No host-country corporate income taxes are collected on this income since these cross-border charges are expenses to the foreign subsidiary. The foreign subsidiary's tax savings from shifting this income is $\tau^* C_t^*$ and is incorporated into the dividend flow in (4.8).

The host country may impose withholding taxes on some cross-border charges. In Canada, withholding taxes are charged on dividends, interest, and royalty payments made from a Canadian foreign subsidiary to a foreign parent corporation. Withholding taxes are not paid on cross-border charges for tangible goods and intangible goods and services such as management fees, although tangible goods may be subject to tariffs. The default withholding tax rate is 25 percent, although tax treaties reduce the rate. For Canadian subsidiaries of US MNEs, the current rate on dividends as of 2000 is 5 percent. We define w^d as the withholding tax on dividends.

In Canada, the current withholding tax rate on interest and royalties is 10 percent. For simplicity we lump interest and royalty payments together as one cross-border charge, which is subject to a withholding tax of w^f.

The funds from the foreign subsidiary that are available to the parent are the sum of the dividends and the cross-border charges less any withholding taxes owing to the host government. The flow of funds from the foreign subsidiary to the parent, net of all taxes, can be denoted as

$$\Psi_t = \left(1 - w^d\right) D_t^* + \left(1 - w^f\right) C_t^* \tag{4.9}$$

4-3.2. *Home taxation of repatriated and shifted income*

Taxation of income repatriated through dividends

The home country applies taxes to the dividend income of the foreign subsidiary based on the amount of the dividend before host taxation. This is known as the grossed-up dividend since the dividend received is grossed-up by the amount of host taxes paid. The grossed-up dividend is equal to

$$D_t^{*g} = D_t^* + \left(\frac{T_t^*}{\Pi_t^* - T_t^*}\right) D_t^* = \left(\frac{\Pi_t^*}{\Pi_t^* - T_t^*}\right) D_t^* \tag{4.10}$$

where Π_t^* is the taxable income of the foreign subsidiary, which equals revenues reported for tax purposes, $f\left(K_t^*\right) - C_t^*$, less depreciation and interest expenses, such that $\Pi_t^* = f\left(K_t^*\right) - C_t^* - iB_{t-1}^* - \alpha^* \hat{K}_t^*$.

Typically, the home country calculates the grossed-up dividend based on the host taxes that were *deemed* to have been paid and not the actual taxes paid. Differences in these two definitions of taxable income may arise because of differing treatments for the deduction of interest expenses or a different value for the capital consumption allowance. For simplicity, we assume that the home and host countries use the same specification for gross profits of the foreign subsidiary.[10] Given this simplification, (4.10) reduces to

$$D_t^{*g} = \left(\frac{1}{1-\tau^*}\right) D_t^* \tag{4.11}$$

The home country tax liability on the income repatriated through dividends is simply equal to the home tax liability on the grossed-up dividends less any foreign tax credits that the MNE may claim.

The foreign tax credit is equal to the corporate taxes paid on the dividend plus any withholding taxes paid on dividends

$$\begin{aligned} FTC_t^{D_t^*} &= \left(\frac{T_t^*}{\Pi_t^* - T_t^*}\right) D_t^* + w^d D_t^* \\ &= \left(\frac{\tau^*}{1-\tau^*}\right) D_t^* + w^d D_t^* \end{aligned} \tag{4.12}$$

Note that the withholding tax was applied to the actual dividend received and not the grossed-up dividend.

From (4.11) and (4.12), assuming there is no cross crediting of cross-border charges and dividends, we can define the home country tax liability on repatriated dividends as

$$\begin{aligned} T_t^{D_t^*} &= \tau D_t^{*g} - FTC_t^{D_t^*} \\ &= \left(\frac{\tau}{1-\tau^*}\right) D_t^* - \left(\frac{\tau^*}{1-\tau^*}\right) D_t^* - w^d D_t^* \\ &= \left[\frac{\tau - \tau^* - (1-\tau^*) w^d}{1-\tau^*}\right] D_t^* \end{aligned} \tag{4.13}$$

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[10] Leechor and Mintz (1993) allow for different definitions of gross profits. The result is a more complex specification for the user cost of capital. Mintz and Tsiopolous (1994) show the differences that arise when different definitions of gross profits are used.

Foreign tax credits are typically non-refundable. Therefore, it must be the case that $T_t^{D_i^*} \geq 0$. Imposing this condition on (4.13), we find that the following must hold

$$\tau \geq \tau^* + (1-\tau^*)w^f \tag{4.14}$$

We do not make any *a priori* assumptions about the relationship between τ and τ^* because it is possible to have $\tau > \tau^*$ and not have (4.14) satisfied.

When (4.14) is satisfied, the MNE is in a **deficit foreign tax credit position** (or neither a deficit nor surplus foreign tax credit position if (4.14) holds as an equality). A deficit foreign tax credit position implies the foreign tax credits that the MNE claims for the foreign taxes paid do not completely offset the home tax liability. As a result, the repatriated income will be subject to home-country taxation. The MNE will end up paying the host-country tax rate on the repatriated income and the difference between the home-country tax rate and the host-country tax rate on the income once it is repatriated. Therefore, in the deficit foreign tax credit position, double taxation will occur.

If (4.14) does not hold, then $T_t^{D_i^*} < 0$, implying the MNE is in a **surplus foreign credit position**. In this case, the home tax liability on the income repatriated through dividends is less than the host tax liability plus withholding taxes. When the MNE is in a surplus foreign tax credit position, the income will be taxed by the host-country and no taxes will be paid to the home country. Since the surplus foreign tax credits cannot be refunded, the MNE ends up paying the higher host-country tax rate on the income. Therefore, a surplus foreign tax credit position implies that some credits go unused.

In some countries, the surplus foreign tax credit can only be applied against other taxes owing by the parent if tax laws permit. For example, the US uses a global tax credit method that in limited circumstances allows surplus credits from one country to be used to offset US tax liabilities from foreign income repatriated from another country. This results in a more complicated specification since surplus foreign tax credits arising from dividend repatriation from one foreign subsidiary can be used to offset a deficit foreign tax credit position arising from the dividend repatriation of another foreign subsidiary. We ignore the possibility of this cross-crediting by assuming the parent has only one foreign subsidiary.

To incorporate the condition that $T_t^{D_t^*} \geq 0$, we introduce a dummy variable, μ, such that

$$\mu = \begin{cases} 0 & \text{if excess foreign tax credits exist} \\ 1 & \text{otherwise} \end{cases} \tag{4.15}$$

Using this dummy variable, we redefine (4.13) as

$$T_t^{D_t^*} = \mu\left[\frac{\tau - \tau^* - (1-\tau^*)w^d}{1-\tau^*}\right]D_t^* \tag{4.16}$$

The home tax liability on income repatriated through dividends is therefore

$$T_t^{D_t^*}\Big|_{\mu=0} = 0 \text{ implying } \tau < \tau^* + (1-\tau^*)w^d$$

and

$$T_t^{D_t^*}\Big|_{\mu=1} = \left[\frac{\tau - \tau^* - (1-\tau^*)w^d}{1-\tau^*}\right]D_t^* \text{ implying } \tau \geq \tau^* + (1-\tau^*)w^d.$$

The home tax liability on income repatriated through dividends has been ignored in previous studies. Typically, the MNE is assumed to face a higher tax rate in the host country, thus resulting in a surplus foreign tax credit position for the parent corporation in the home country. Further, several studies have not specified the actual tax rate in each jurisdiction, but instead use an effective tax rate. One contribution of this paper is that we add the country-specific corporate tax rates and withholding tax rates and we also incorporate the ability to examine both the surplus and deficit foreign tax credit cases within the same framework.

Taxation of income shifted through cross-border charges

In addition to the taxes paid by the parent on income repatriated through dividends, taxes are also due on the income shifted using cross-border charges. The home country will tax the parent on the income shifted from the foreign subsidiary at the same tax rate as on dividends, τ, and provides a tax credit for foreign taxes paid. The home-country tax liability on this income source is equal to

$$\begin{aligned} T_t^{C_t^*} &= \tau C_t^* - FTC_t^{C_t^*} \\ &= \tau C_t^* - w^f C_t^* \\ &= \left(\tau - w^f\right) C_t^* \end{aligned} \tag{4.17}$$

As noted earlier, withholding taxes in Canada on cross-border charges are 25 percent, although tax treaties reduce the rate. For Canadian subsidiaries of US MNEs, the current rate as of 1999 on interest and royalties is 10 percent. Since some cross-border charges, such as management fees, are not subject to withholding taxes, the effective withholding tax on cross-border charges will not be very large. For simplicity, we assume that $\tau > w^f$, resulting in the parent always having a deficit foreign tax credit with respect to cross-border charges.[11] Thus, C_t^* will be taxed by the home country.

Total home tax liability

Combining (4.16) and (4.17), we know that the total home tax liability for the parent for repatriated and shifted income is

$$\begin{aligned} T_t &= T_t^{D_t^*} + T_t^{C_t^*} \\ &= \mu\left[\frac{\tau - \tau^* - \left(1-\tau^*\right)w^d}{1-\tau^*}\right] D_t^* + \left(\tau - w^f\right) C_t^* \end{aligned} \tag{4.18}$$

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[11] US tax law requires that foreign tax credits are calculated separately for different sources of income. The limitation on foreign tax credits is calculated as an overall limitation or as separate limitations depending upon the source of the income. Dividends received from a controlled foreign subsidiary are treated as a separate limitation. For this reason, we determine separately the dividend and cross-border charges foreign tax credit positions of the parent corporation.

4-3.3. *Value of the parent's investment in the host country*

The value of the parent's investment in the host country must take into account both the host and home country's tax systems. Utilising (4.9) and (4.18), the net-of-tax cash flow received by the parent from the foreign subsidiary in time *t* is

$$\begin{aligned} \overline{\Psi}_t &= \left(1-w^d\right)D_t^* + \left(1-w^f\right)C_t^* - T_t \\ &= \left(1-\sigma^*\right)D_t^* + \left(1-\tau\right)C_t^* \end{aligned} \tag{4.19}$$

where σ^*, the tax cost of dividends paid to the parent is

$$\sigma^* = \frac{\mu\left(\tau-\tau^*\right)+\left(1-\mu\right)\left(1-\tau^*\right)w^d}{1-\tau^*} \tag{4.20}$$

Note that in the surplus foreign tax credit position $\sigma^*\big|_{\mu=0} = w^d$. This result implies that the only additional cost of repatriating dividends from the foreign subsidiary is the withholding tax collected upon repatriation. Since the parent is in a surplus foreign tax credit position, the home tax liability on the repatriated dividends is nil. The global tax liability is therefore limited to the host-country corporate tax and the host-country withholding tax. In the deficit foreign tax credit position, $\sigma^*\big|_{\mu=1} = \left(\tau-\tau^*\right)/\left(1-\tau^*\right)$. Unlike the surplus foreign tax credit position, the additional tax burden is the difference between the home- and host-country corporate tax rates imposed on the grossed-up dividend. In this case, the withholding tax is irrelevant. Since the parent is in a deficit foreign tax credit position, the host-country corporate tax liability plus the withholding tax liability is insufficient to offset all of the home-country tax liability on the repatriated dividends. All the foreign tax liability is therefore used to reduce the home-country tax liability but there still exists a positive home-country tax liability. This liability is the difference between the home- and host-country corporate tax rates. The global tax rate is the home country tax rate, τ.

Also note that $\overline{\Psi}_t$ is independent of w^f because it is assumed that withholding taxes related to cross-border charges are always fully credited against the home-country tax liability.

The present value of the income accruing to the parent is equal to the net-of-tax cash flow, discounted by the discount rate of the parent, ρ (the opportunity cost of equity financing) such that

$$V_t = \sum_{t=1}^{\infty} \left(\frac{1}{1+\rho} \right)^t \overline{\Psi}_t \tag{4.21}$$

4-4. Solutions to the model

The objective of the MNE is to maximise the present value of the net-of-tax cash flow from the foreign subsidiary by choosing the size of its capital stock, stock of debt, and the amount of cross-border charges. This problem can be expressed as

$$\max_{\{K_t^*, \hat{K}_t^*, B_t^*, C_t^*\}} \quad V_t = \sum_{t=1}^{\infty} \left(\frac{1}{1+\rho} \right)^t \overline{\Psi}_t \tag{4.22}$$

subject to

$$\hat{K}_t^* \geq (1-\alpha^*)\hat{K}_{t-1}^* + (1-\phi^*)K_t^* - (1-\phi^*)(1-\delta^*)K_{t-1}^* \tag{4.23}$$

$$D_t^* \geq 0 \tag{4.24}$$

$$\gamma^* K_t^* \geq B_t^* \tag{4.25}$$

$$\beta^* f(K_t^*) - C_t^* \geq 0 \tag{4.26}$$

$$B_t^* \geq 0 \tag{4.27}$$

The Lagrange multipliers, λ_t^1 through λ_t^5, are for equations (4.23) through (4.27) respectively. Equation (4.23) is the undepreciated cost allowance used by the host and home countries. Equation (4.24) requires that dividends are non-negative because negative dividends are the same as an equity injection into the foreign subsidiary by the parent. We have assumed the parent does not make these equity injections.

Further, the tax treatment of an equity injection likely will not be the same as a negative dividend. For example, an equity injection by the parent does not result in a credit of withholding taxes that would occur if the equity injection was a negative dividend.

Equation (4.25) is a thin capitalisation restriction. While the foreign subsidiary is permitted to issue debt, it cannot issue debt beyond some multiple of its equity because of a thin capitalisation regulation in the host country's tax laws. This restriction does not normally apply to debt held by third parties and only applies to debt held by a related party (*e.g.*, the parent corporation). For simplicity, we assume that all debt is held by the parent. Therefore, the debt is related-party debt and is subject to the thin capitalisation constraint.

Since capital is simply debt plus equity, we can write the thin capitalisation constraint in terms of debt and capital. As such, (4.25) requires the foreign subsidiary to limit its debt issues to no more than some fraction of its capital stock. Technically, the company may issue debt in excess of $\gamma^* K_t^*$ but the foreign subsidiary is not permitted to deduct the interest expense on the amount of debt that exceeds the restriction. As such, the parent would be better off to borrow at home and inject equity into the foreign subsidiary in order to take advantage of the ability to deduct the interest expense from the parent's taxable income. We assume the constraint is not violated since it would never be optimal to do so.

The inclusion of the thin capitalisation restriction is another component of our model that distinguishes it from other papers. While some work has been done on the issue of the debt structure of MNEs, we are not aware of any research that incorporates both a thin capitalisation restriction and the ability to shift income through transfer pricing into a calculation of the user cost of capital and the optimal behaviour of the firm.

Equation (4.26) implies that the scope for transfer pricing is bounded. The foreign subsidiary cannot shift more than some fraction, β^*, of true revenues, $f(K_t^*)$. Therefore, the foreign subsidiary may not be able to shift all revenues to the parent to avoid taxation in the host country. Recall from Weichenrieder (1996a), the MNE is not free to shift any desired amount of income between entities. First, Caves (1982) suggests that distorted transfer prices may provide the wrong signals to profit centres and may reduce efficiency. Second, it seems reasonable that the tax authority would not allow transfer price manipulation to lead to a sustained period of losses for a foreign subsidiary of the MNE. Finally, (4.27) prevents the foreign subsidiary from making loans.

We assume an interior solution for dividends and debt since this is the issue we wish to examine. These assumptions imply that $D_t^* > 0$ and $B_t^* > 0$. The Lagrangian corresponding to (4.22) through (4.27), using the above-noted interior solution conditions is:

$$\begin{aligned} \underset{K_t^*,\hat{K}_t^*,B_t^*,C_t^*}{L} = \sum_{t=0}^{\infty}\left(\frac{1}{1+\rho}\right)^t \Big\{ & (1-\sigma^*)\Big[(1-\tau^*)\big(f(K_t^*)-C_t^*-iB_{t-1}^*\big)+\tau^*\alpha^*\hat{K}_t^* - \\ & \left(1-\phi^*+\tau^{k^*}\right)K_t^* + \left(1+\phi^*-\delta^*\right)K_{t-1}^* + B_t^* - B_{t-1}^*\Big] + (1-\tau)C_t^* + \\ & \lambda_t^1\Big[(1-\alpha^*)\hat{K}_{t-1}^* + (1-\phi^*)K_t^* - (1-\phi^*)(1-\delta^*)K_{t-1}^* - \hat{K}_t^*\Big] + \\ & \lambda_t^3\big[\gamma^* K_t^* - B_t^*\big] + \lambda_t^4\big[\beta^* f(K_t^*) - C_t^*\big]\Big\} \end{aligned} \tag{4.28}$$

The first-order conditions for the maximisation problem are as follows:

$$\frac{\partial L}{\partial \hat{K}_t^*} = (1-\sigma^*)\tau^*\alpha^* - \lambda_t^1 + \left(\frac{1}{1+\rho}\right)(1-\alpha^*)\lambda_{t+1}^1 = 0 \tag{4.29}$$

$$\frac{\partial L}{\partial B_t^*} = (1-\sigma^*) - \lambda_t^3 - \left(\frac{1}{1+\rho}\right)(1-\sigma^*)\left[i(1-\tau^*)+1\right] = 0 \tag{4.30}$$

$$\frac{\partial L}{\partial C_t^*} = -(1-\sigma^*)(1-\tau^*) + (1-\tau) - \lambda_t^4 = 0 \tag{4.31}$$

$$\begin{aligned}\frac{\partial L}{\partial K_t^*} &= (1-\sigma^*)(1-\tau^*)f'(K_t^*)-(1-\sigma^*)(1-\phi^*+\tau^{k^*})+ \\ &\quad (1-\phi^*)\lambda_t^1+\gamma^*\lambda_t^3+\beta^* f'(K_t^*)\lambda_t^4+ \\ &\quad \left(\frac{1}{1+\rho}\right)\left[(1-\sigma^*)(1-\phi^*)(1-\delta^*)-(1-\phi^*)(1-\delta^*)\lambda_{t+1}^1\right]=0\end{aligned} \tag{4.32}$$

along with the following Kuhn-Tucker conditions:

$$\lambda_t^1 \geq 0,\ (1-\alpha^*)\hat{K}_{t-1}^*+(1-\phi^*)K_t^*-(1-\phi^*)(1-\delta^*)K_{t-1}^*-\hat{K}_t^* \geq 0, \text{ and}$$

$$\lambda_t^1\left[(1-\alpha^*)\hat{K}_{t-1}^*+(1-\phi^*)K_t^*-(1-\phi^*)(1-\delta^*)K_{t-1}^*-\hat{K}_t^*\right]=0 \tag{4.33}$$

$$\lambda_t^2 \geq 0,\ D_t^* \geq 0, \text{ and } \lambda_t^2 D_t^*=0 \tag{4.34}$$

$$\lambda_t^3 \geq 0,\ \gamma^* K_t^*-B_t^* \geq 0, \text{ and } \lambda_t^3(\gamma^* K_t^*-B_t^*)=0 \tag{4.35}$$

$$\lambda_t^4 \geq 0,\ \beta^* f(K_t^*)-C_t^* \geq 0, \text{ and } \lambda_t^4\left[\beta^* f(K_t^*)-C_t^*\right]=0 \tag{4.36}$$

$$\lambda_t^5 \geq 0,\ B_t^* \geq 0, \text{ and } \lambda_t^5 B_t^*=0 \tag{4.37}$$

where $\hat{K}_t^*$ is defined by (4.23) and D_t^* is defined by (4.8).

Since we assumed an interior solution such that $D_t^* > 0$ and $B_t^* > 0$, it must follow that $\lambda_t^2 = 0$ and $\lambda_t^5 = 0$. Next, we solve for the various shadow prices. From (4.31), we know that

$$\lambda_t^4 = (\tau^*-\tau)+(1-\tau^*)\sigma^* \tag{4.38}$$

This is the shadow price on the cross-border charges constraint. If we were able to increase the amount of cross-border charges by one dollar, (4.38) represents the benefit of doing so. In the surplus credit case, by (4.20),

$$\lambda_t^4 = (\tau^*-\tau)+(1-\tau^*)w^d \tag{4.39}$$

If we were able to increase the amount of cross-border charges by one dollar, (4.39) represents the benefit of this change in the surplus foreign tax credit position. For every additional dollar of cross-border charges, the subsidiary does not have to pay τ^* and does not pay w^f on the after tax income of $(1-\tau^*)$. When the income is repatriated to the parent the tax liability is τ. The host country collected a withholding tax on the cross-border charges of w^f, but since $\tau > w^f$, the withholding tax is fully credited against the home tax liability. The net benefit is given by (4.39); see also Proposition 1A.

In the deficit foreign tax credit case, $\sigma^* = (\tau - \tau^*)/(1-\tau^*)$, and therefore $\lambda_t^4 = 0$. There is no net benefit to increasing the amount of cross-border charges since the home-country tax liability on the shifted income will exceed the host-country tax liability–see also Proposition 1B.

From (4.30) we find that

$$\lambda_t^3 = \left(\frac{1-\sigma^*}{1+\rho}\right)\left[\rho - i(1-\tau^*)\right] \tag{4.40}$$

and (4.29) yields

$$\lambda^1 = \frac{(1-\sigma^*)(1+\rho)\tau^*\alpha^*}{\rho+\alpha^*} \tag{4.41}$$

provided we assume a steady-state equilibrium such that $\lambda^1 = \lambda_t^1 = \lambda_{t+1}^1$. Regardless of the foreign tax credit position of the MNE, since $\sigma^* \in [0,1]$, λ^1 is non-negative and, from (4.33), $\hat{K}_t^* = (1-\alpha^*)\hat{K}_{t-1}^* + (1-\phi^*)K_t^* - (1-\phi^*)(1-\delta^*)K_{t-1}^*$.

From (4.38) through (4.41) and the slackness conditions, (4.33) through (4.37), we arrive at the following propositions.

Proposition 1A: *If the MNE is in a surplus foreign tax credit position, then* $C_t^* = \beta^* f(K_t^*)$ *implying the MNE uses cross-border charges to shift as much income to the parent as possible.*

Proof: A surplus foreign tax credit position implies $\tau^* + (1-\tau^*)w^d > \tau$ and $\mu = 0$ so that $T_t^{D_t^*} \geq 0$. Substituting for σ, (4.38) reduces to (4.39). Suppose $\lambda_t^4 > 0$. It must follow that

$$(\tau^* - \tau) + (1-\tau^*)w^d > 0 \tag{4.42}$$

which can be rewritten as

$$\tau^* + (1-\tau^*)w^d > \tau \tag{4.43}$$

Note that (4.43) is the condition that is necessary for the parent to be in a surplus foreign tax credit position. Since (4.43) must hold when the parent is in a surplus foreign tax credit position, it must be the case that $\lambda_t^4 > 0$. Given this result, (4.36) holds only if $C_t^* = \beta^* f(K_t^*)$. *Q.E.D.*

Intuitively, for the parent to be in a surplus foreign tax credit position, it must be the case that the total tax liability owed to the host country on the repatriated dividends exceeds the tax liability to the home country on the repatriated income. The home tax liability is zero since the surplus credits cannot be utilised. The global tax liability is the sum of the host tax rate plus the withholding tax. Repatriating another dollar of income through dividends is not desirable. Since the parent is already in a surplus foreign tax credit position, any further repatriations result in a larger, unusable, foreign tax credit. The global tax liability remains the sum of the host tax rate plus the withholding tax.

Consider what occurs if the parent uses cross-border charges to repatriate income rather than dividend repatriation to shift another dollar of income. Since cross-border charges are expenses to the foreign subsidiary, they are deductible from taxable income. Thus, the only tax collected by the host country is the withholding tax, if any. Since we have assumed that the withholding tax rate is smaller than the home corporate tax rate, the parent will be able to claim the foreign tax credit for the withholding tax on the cross-border charges. The host tax liability was limited to the withholding tax and the home tax liability is the difference between the home tax rate and the withholding tax. The global tax liability is just the home tax rate. Since the home tax rate is less than the host tax rate had the income not been shifted, the global tax liability can be reduced by shifting income. To reduce the global tax liability by the maximum, the foreign subsidiary should shift as much income as is possible to the parent. Thus, $C_t^* = \beta^* f(K_t^*)$.

Proposition 1B: *If the* MNE *is in a deficit foreign tax credit position, then* $C_t^* < \beta^* f(K_t^*)$ *and the optimal policy is for the parent to shift income to the foreign subsidiary and for* $C_t^* < 0$.

Proof: If the MNE is in a deficit foreign tax credit position, $\mu = 1$ then $\sigma^* = (\tau - \tau^*)/(1-\tau^*)$, implying $\lambda_t^4 = 0$. For (4.36) to hold, it must be that $\beta^* f(K_t^*) - C_t^* > 0$, which means $C_t^* < \beta^* f(K_t^*)$. Since $\tau > \tau^* + (1-\tau^*)w^d$, it must be the case that $\tau > \tau^*$. The MNEs global tax liability can therefore be reduced by shifting income from the parent to the foreign subsidiary to take advantage of the lower tax rates in the foreign country. Thus, $C_t^* < 0$ is optimal, which still satisfies the condition that $C_t^* < \beta^* f(K_t^*)$. *Q.E.D.*

Our specification does not formally impose any boundaries on C_t^*. However, any cross-border charges for the foreign subsidiary will have a corresponding (and opposite) charge for the parent corporation (*i.e.*, $C_t^* = -C_t$). It is reasonable to expect that the limitations that the home government places on C_t^* would also be imposed by the host-country government on the parent corporation such that $\beta f(K_t) - C_t \geq 0$.

Intuitively, the deficit foreign tax credit case implies that $\tau > \tau^* + (1-\tau^*)w^d$. Income from the foreign subsidiary repatriated through dividends are therefore taxed at a higher rate at home. The parent receives a foreign tax credit for all foreign taxes paid, but this credit is insufficient to offset the home taxes on this income. The additional tax cost of dividend repatriation is

$$\frac{(\tau-\tau^*)}{(1-\tau^*)}D_t^* \tag{4.44}$$

and the global tax liability is τ. If dividends increase, the tax cost increases. The MNE would minimise the global tax liability if income was shifted from the parent the foreign subsidiary, thus setting $C_t^* < 0$. In this case, the marginal tax rate on cross-border charges from the parent to the foreign subsidiary would be less than τ^*.

Proposition 2: *With the optimal financial policy, the thin capitalisation constraint is binding (i.e.,* $\gamma^* K_t^* = B_t^*$*) only if* $\rho > i(1-\tau^*)$*; the foreign tax credit position of the* MNE *is irrelevant.*

Proof: From (4.40), we know that if $\rho - i(1-\tau^*) > 0$, then λ_t^3 is positive. Suppose $\rho - i(1-\tau^*) > 0$ holds. For (4.35) to hold, it must be the case that $\gamma^* K_t^* = B_t^*$. Note that this result is independent of the value of σ^*. In the surplus foreign tax credit case where $\mu = 0$, $\sigma^* = w^d$, $w^d \in [0,1]$, and the sign of λ_t^3 is positive. In the deficit foreign tax credit case where $\mu = 1$, $\sigma^* = (\tau-\tau^*)/(1-\tau^*)$, $\sigma^* \in [0,1]$, and the sign of λ_t^3 is positive. Therefore, the sign of λ_t^3 does not depend on the foreign tax credit position of the MNE. *Q.E.D.*

When the foreign subsidiary borrows money, it can deduct the interest payments from taxable income, resulting in a tax savings of $\tau^* i$ so the net cost of borrowing is $i(1-\tau^*)$. As long as the parent corporation's discount rate exceeds the net cost of borrowing, $\rho > i(1-\tau^{*})$, the foreign subsidiary will want to finance its entire operations by debt alone. Since we have imposed a thin capitalisation constraint, the foreign subsidiary will continue to borrow until the constraint is binding.

If $\rho < i(1-\tau^{*})$, the parent corporation's discount rate capital does not exceed the cost of borrowing to make new investment in capital. In this case, the MNE prefers that the foreign subsidiary uses equity to finance its operations. Since equity injections from the parent corporation are not permitted in our model, equity finance is simply the use of retained earnings. The insufficient return on equity causes the thin capitalisation constraint not to bind. In fact, if $\rho < i(1-\tau^{*})$, then λ_t^3 is negative which is not permitted. This implies that we must have a corner solution and $B_t^{*} = 0$.

Note that since the parent corporation cannot inject new equity into the foreign subsidiary and no debt financing is used, retained earnings are assumed to be sufficient to finance new capital expenditures. The foreign subsidiary will prefer to grow by investing excess funds in bonds which would earn an after-tax return of $i(1-\tau^{*})$. Since we restrict debt to be non-negative, we do not allow the foreign subsidiary to make investments with excess funds, and instead, all retained earnings will be used to finance new capital expenditures. If we do not restrict debt to be non-negative, we will need to incorporate passive income restrictions into the model as in Weichenrieder (1996b).

What is the after-tax return required by the parent? The answer to this question depends upon the source of financing used by the parent corporation. The parent corporation, as with the foreign subsidiary, can use debt or equity financing with equity financing coming from either issuing more equity shares in the corporation or using retained earnings instead of paying dividends.

If only equity is used then the discount rate, ρ, is simply the opportunity cost of equity finance for the parent in the home country which is the gross of personal taxes that would be paid by individual investors in the parent corporation. In this case, one choice for ρ is simply the gross market rate of interest, i. In this case, the foreign subsidiary will borrow up to the thin capitalisation constraint provided that the host-country tax rate is positive; the home-country tax rate has no bearing on the financing decision of the foreign subsidiary.

If only debt financing is used by the parent corporation, then the discount rate would be $\rho = i(1-\tau)$, the after-tax cost of debt financing in the home country. In this case, the subsidiary would borrow up to the thin capitalisation constraint as long as $\tau^{*} > \tau$. Now the home-country tax rate does affect the financing decision of the foreign subsidiary.

Finally, if the parent's equity investment is financed by some combination of existing equity and borrowing, then the required return would be a convex combination of the two options. Since we do not know the optimal financing decision of the parent corporation, we cannot know with certainty what the discount rate is.

4-4.1. User cost of capital

Finally, substituting (4.38), (4.40), and (4.41) into (4.32) we can derive the following equation for the user cost of capital:

$$f'(K_t^{*}) = \left\{ \frac{(1-\sigma^{*})}{(1-\sigma^{*})(1-\tau^{*}) - \beta^{*}\left[\tau - \tau^{*} - (1-\tau^{*})\sigma^{*}\right]} \right\} \cdot (1-A) \tag{4.45}$$

where $(1-A)$ is defined as

$$\begin{aligned}(1-A) = {} & \left(1-\phi^{*}+\tau^{k*}\right) - \frac{\gamma^{*}}{(1+\rho)}\left[\rho - i(1-\tau^{*})\right] - \frac{(1-\phi^{*})(1-\delta^{*})}{(1+\rho)} - \\ & \frac{\tau^{*}\alpha^{*}(1-\phi^{*})}{(\rho+\alpha^{*})}\left[\rho+\delta^{*}\right]\end{aligned} \tag{4.46}$$

Let us define UCC^{E} as the user cost of capital in the surplus foreign tax credit position such that

$$UCC^E = f'(K_i^*)\big]_{\mu=0} = \left\{\frac{(1-w^d)}{(1-w^d)(1-\tau^*)-\beta^*\left[\tau-\tau^*-(1-\tau^*)w^d\right]}\right\}(1-A) \tag{4.47}$$

Further, let UCC^D be the user cost of capital for the deficit foreign tax credit case such that

$$UCC^D = f'(K_i^*)\big]_{\mu=1} = \left(\frac{1}{1-\tau^*}\right)(1-A) \tag{4.48}$$

Note that (4.48) is not a function of β^*. In the deficit foreign tax credit case cross-border charges flow from the parent to the foreign subsidiary and any host-country restrictions on the fraction of profits that could be shifted become irrelevant. In fact, the user cost of capital in the surplus foreign tax credit case, (4.47), reduces to the user cost of capital in the deficit foreign tax credit case, (4.48), when β^* is equal to zero, implying no income shifting is present.

4-5. Comparative statics

Next we examine changes in corporate tax rates and the proportion of income that can be shifted through cross-border charges and their effects on the user cost of capital. We consider the surplus and deficit foreign tax credit cases separately.

4-5.1. Surplus foreign tax credit position

Consider the impact on the user cost of capital if a MNE is able to increase the proportion of income that can be shifted through cross-border charges from the foreign subsidiary to the parent. The derivative of the user cost of capital, UCC^E, with respect to β^* is

$$\frac{\partial UCC^E}{\partial \beta^*} = \left[\tau-\tau^*-(1-\tau^*)w^d\right](1-w^d)\frac{(1-A)}{G^2} < 0 \tag{4.49}$$

where

$$G = (1-w^d)(1-\tau^*)-\beta^*\left[\tau-\tau^*-(1-\tau^*)w^d\right] \tag{4.50}$$

When the MNE is in a surplus foreign tax credit position, $\tau < \tau^{*} + (1-\tau^{*})w^{d}$. Therefore, the first bracketed term in (4.49) is negative while G and A are positive resulting in $\partial UCC^{E} / \partial \beta^{*} < 0$. In the surplus credit case, if the MNE can increase the proportion of income shifted from the foreign subsidiary to the parent, the user cost of capital declines. Shifting income from the foreign subsidiary to the parent reduces the global tax liability of the MNE and will therefore reduce the MNE's user cost of capital.

Next, consider the impact on the user cost of capital when the host country increases the corporate income tax rate. In this case

$$\frac{\partial UCC^{E}}{\partial \tau^{*}} = \frac{(1-w^{d})}{G}\left\{(1-\beta^{*})UCC^{E} - \frac{\gamma^{*} i}{(1+\rho)} - \frac{\alpha^{*}(1-\phi^{*})(\rho+\delta^{*})}{(\rho+\alpha^{*})}\right\} \tag{4.51}$$

Intuitively, an increase in τ^{*} affects the user cost of capital through two channels. First, the tax rate on taxable income will increase, thus increasing the user-cost of capital. But, the foreign subsidiary shifts β^{*} to the parent corporation so only $(1-\beta^{*})$ will be subjected to this increased tax rate and the effect on the user cost of capital from this channel is represented by the first component of the large bracketed term in (4.51). The second channel is the effect on the user cost of capital resulting from increased deductions due to the higher tax rate. Most notably, interest expenses and the capital cost allowance deductions that are available to the subsidiary are more valuable in that the tax savings is now larger. This savings is represented by the second half of the large bracketed term in (4.51). Finally, the difference between the two channels is scaled by $(1-w^{d})/G$. This term takes into account the fact that the original user cost of capital is based on the original host-country tax rate and the effect of the change in this tax rate must take into account the new value of τ^{*} which appears in G.

The sign of (4.51) is ambiguous and requires knowledge of the various tax rates and credits that are available along with the value of β^{*}. For reasonable values of the other tax parameters, we find that an increase in the host-country tax rate will increase the user cost of capital when β^* is below 0.30. Table 4-1 summarises these estimates. Intuitively, when β^* is small, the first channel dominates and because the subsidiary is unable to shift enough income to the parent corporation to avoid the additional host-country tax liability, the user-cost of capital increases. For higher values of β^*, the ability to shift sizeable amounts of income to the parent corporation causes the first channel effect to be small and in this case the second channel dominates. An increase in the tax rate allows the subsidiary to gain the benefit of tax savings from interest and capital consumption allowance deductions without suffering much increase in the tax liability on taxable income.

This result suggests that once a MNE sets up operations in a foreign jurisdiction, if the foreign subsidiary is able to shift enough income to the parent corporation, then the MNE will not be concerned if the host country tax rate increases since these increases can actually decrease the user cost of capital.[12] This effect critically depends upon the ability of the foreign subsidiary to shift enough income to the parent corporation thus causing the benefit from the second channel to more than offset the increase in the user cost of capital caused by the first channel.

Also, notice that if β^* increases G increases and $\partial UCC^E/\partial\tau^*$ decreases. Thus, the impact of the host-country tax change can be somewhat offset if the MNE can find an exogenous way to increase the proportion of income shifted from the foreign subsidiary to the parent.

The impact of a change in the home-country corporate tax rate on the user cost of capital is

$$\frac{\partial UCC^E}{\partial\tau} = \beta^* \frac{1}{G} UCC^E > 0 \qquad (4.52)$$

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[12] This result assumes the increase in the tax rate does not cause the MNE to switch from a surplus foreign tax credit position to a deficit foreign tax credit position.

Since the MNE is in a surplus foreign tax credit position, provided the increase in the home-country tax rate does not cause the parent to switch to a deficit foreign tax credit position, a higher home-country corporate tax rate will not affect the cost of the dividend repatriations; any additional home-country tax liability can be offset by depleting the surplus foreign tax credits.

However, any income shifted through cross-border charges will be subject to the higher home-country tax rate, causing the user cost of capital to increase. Therefore, with a higher value of β^*, more income is shifted to the parent corporation and the tax cost on the shifted income is higher. The total effect is scaled by G to account for the change in the original value of the user cost of capital that arises under the new tax rate.

The conventional wisdom of Hartman (1985) suggests that the home-country tax rate does not affect the user cost of capital in the excess foreign tax credit case. Assuming the host-country tax rate remains above the home-country tax rate, the tax liability paid to the host government will still exceed the tax liability in the home country. In our model, we find that an increase in the home-country tax rate does affect the user cost of capital, thus directly contradicting the Hartman (1985) result. Our result occurs due to the ability to shift income to the home country and the shifted income will be subject to the home-country tax rate because this income will be in a deficit foreign tax credit case. Earlier studies limit the income flows from the foreign subsidiary to the parent corporation to be in the form of dividends. The distinction between shifted income and repatriated income is crucial; without the distinction, our result will not arise.

4-5.2. *Deficit foreign tax credit position*

Consider the impact on the user cost of capital when the host country increases the corporate tax rate. In this case

$$\frac{\partial UCC^D}{\partial \tau^*} = \frac{1}{(1-\tau^*)}\left\{UCC^D - \frac{\gamma^* i}{(1+\rho)} - \frac{\alpha^*(1-\phi^*)(\rho+\phi^*))}{(\rho+\alpha^*)}\right\} \tag{4.53}$$

As with the surplus foreign tax credit case, the impact of an increase in the host-country corporate tax rate in the deficit foreign tax credit case has two channels. The first channel represents the increase in the user cost of capital that arises from paying higher taxes on the taxable income. The second channel is the tax savings that arises because the deductions for interest expenses and the capital consumption allowance are larger when the host-country tax rate is higher.

The sign of (4.53) can only be found by using some estimates for the variables. However, it is easy to show that using reasonable estimates for the variables, (4.53) is positive. Intuitively, increasing the host-country tax rate increases the tax liability in the host country which cannot be avoided through income shifting because the income is shifted to the foreign subsidiary. Thus, all income of the foreign subsidiary is subjected to the higher tax rate through the first channel. There is a savings through the second channel whereby the deductions for interest expenses and depreciation are now more valuable since these deductions result in a larger tax savings at the higher tax rate. However, these savings are not as large as the increase in the tax liability through the first channel. Even if the foreign subsidiary is financed solely by debt, the sign of (4.53) can only be negative if the interest rate is unreasonably high and the capital consumption allowance is significantly larger than the actual depreciation cost, causing the deductions from taxable income to be very large.

In the deficit foreign tax credit case, we find that

$$\frac{\partial UCC^D}{\partial \tau} = 0 \tag{4.54}$$

If the home-country tax rate increases, there is no impact on the retained income of the foreign subsidiary, lending support to the Hartman (1985) result that home-country taxes have no impact on foreign subsidiaries. The intuition behind our result is that the parent corporation is shifting income to the foreign subsidiary, thus driving the profits of the parent corporation toward zero. This is done because it is advantageous from a tax standpoint to report profits in the lower-tax foreign jurisdiction.

Since we have not included a similar expression to β^* for the parent corporation, the expression for the user cost of capital does not take into account the proportion of the parent's income that is shifted to the foreign subsidiary. If we model both the parent corporation and the foreign subsidiary, there would be an analogous income-shifting parameter, β, representing the fraction of the parent corporations' income that can be shifted to the foreign subsidiary. In this case, the result in (4.54) should be similar to the surplus foreign tax credit case when the host-country tax rate increases; the impact of increasing the tax rate in the country where the income is shifted from will depend upon the proportion of income that can be shifted abroad. Therefore, we are not convinced that our result supports the Hartman (1985) result since further modelling is needed to capture the limitations on the income shifting abilities of the parent corporation.

4-6. Conclusions

In this chapter, we develop a model to explain the income shifting behaviour of the MNE when the MNE can use transfer pricing on cross-border charges. We find that income shifting through transfer pricing is important regardless of the foreign tax credit position of the parent corporation, but the foreign tax credit position will determine the direction of the income shifting.

In the surplus foreign tax credit case, not only does our model suggest that transfer pricing occurs, the model suggests that the MNE shifts as much income through transfer pricing as possible. By shifting income through transfer pricing, the MNE does not need to use dividends to repatriate the same money. Since the home-country tax liability on cross-border charges is lower than the tax liability on dividend repatriations, the MNE is better off when it uses cross-border charges and the user cost of capital is lower.

On the other hand, a deficit foreign tax credit position implies the home-country tax liability exceeds the host-country tax liability plus the withholding tax liability on repatriated dividends. In this case, we show that the MNE will prefer to shift income to the foreign subsidiary, rather than from the foreign subsidiary.

An interesting result in our model involves the effect of a change in the host-country tax rate on the user cost of capital. There are two channels that are affecting the user cost of capital. The first channel increases the user cost of capital since taxable income is subjected to a higher tax rate. However, since it is possible to shift income between the foreign subsidiary and the parent corporation, part of this tax liability can be avoided. The second channel reduces the user cost of capital because the deductions for interest expenses and the capital cost allowance are larger. We show that when β^* exceeds some critical value (which is not necessarily very high) an *increase* in the host-country tax rate can actually *decrease* the user cost of capital. The conventional wisdom of Hartman (1985) is that increasing the host-country tax rate will increase the user cost of capital. Our result directly contradicts Hartman (1985). The driving force for our result is the ability to shift pre-tax income to the lower tax jurisdiction.

This result can have significant policy implications for both the MNE and the host-country government. The tax differential and the ability to shift income between the foreign subsidiary and the parent corporation are important considerations for the MNE when deciding where to set up foreign operations. But, once the foreign subsidiary is created, the MNE will be less concerned about changes in the tax rate in the host country. In the surplus foreign tax credit position, as long as the foreign tax credit position remains the same after a change in the tax rate, the user cost of capital will actually decline when the host-country tax rate increases; if the tax rate declines, the user cost of capital increases, but this increase can possibly be offset by reducing the amount of income shifted to the parent corporation.

From the government's standpoint, increasing the host-country tax rate may not have the desired effect on revenues. The higher rates applies to only a portion of taxable income since the foreign subsidiary can shift income abroad, and the deductions from taxable income are larger at the higher tax rate. This suggests that focusing on compliance in an effort to reduce abusive transfer pricing practices is worthwhile. It also suggests that lowering tax rates to be a low-tax jurisdiction could cause more income to be reported in the jurisdiction and could cause revenues to increase since the tax base could increase. However, further modelling in this area is needed.

Unlike previous studies, our model incorporates a thin capitalisation constraint. Debt financing has some tax advantages over equity financing. The thin capitalisation constraint prevents the MNE from financing the operations of the foreign subsidiary with only debt by limiting the foreign subsidiary's stock of debt to be no more than some proportion of its equity. For simplicity, in our model this limit has been respecified in terms of capital.

An interesting result from our model is that the MNEs decision to issue debt up to the maximum permitted by the thin capitalisation constraint is independent of the foreign tax credit position of the parent. Therefore, if the parent corporation is in a deficient foreign tax credit position, suggesting that the host country tax liabilities on income are less than the home-country tax liabilities, the foreign subsidiary will still issue debt until the thin capitalisation constraint will no longer make it desirable to issue debt provided $\rho > i(1-\tau^*)$. Further, depending upon the source of finance used by the parent corporation, the home country tax rate may not affect the financing decision of the foreign subsidiary. Also, if the parent uses both debt and equity, the thin capitalisation constraint can be binding even if $\tau < \tau^*$.

In future work, this paper could be expanded in several ways. First, we simplify the model by using the same definitions for the home- and host-country capital consumption allowance rates and by using the home-country definition of taxable income for grossing-up dividends. Leechor and Mintz (1993) make these distinctions and it may be interesting to incorporate those distinctions in our model. We defined the cross-border charges variable to include all cross-border charges. It can be useful to separately define cross-border charges according to whether or not they are subject to withholding taxes.

While we include a thin capitalisation constraint, we do not distinguish between debt held by related parties and debt held by others. The thin capitalisation constraint typically applies to only the debt held by a related party (*e.g.*, the parent corporation). Future work could distinguish between these two types of debt, and could also incorporate the interest payment as a specific cross-border charge to the parent corporation.

Additionally, specifically modelling the income shifting behaviour of the parent corporation along with the work we have done for the foreign subsidiary could be valuable, particularly if the work is extended to look at the effects on government coffers of various taxation policies.

Another interesting area of study would be to empirically examine the validity of the findings of our model. Extending the model, incorporating a governmental revenue component, and empirical research are areas we wish to study in the future.

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Table 4-1 **Estimates for the effect of changes in the host-country tax rate on the user cost of capital in the surplus foreign tax credit case**

	β					
	0.000	0.250	0.295	0.500	0.750	1.000
UCC^{E}	0.198	0.188	0.187	0.179	0.171	0.164
$\frac{\partial UCC^{E}}{\partial \tau^{*}}$	0.122	0.017	0.000	-0.069	-0.139	-0.197

Source: Author's calculations.

Parameter values for estimates are: $t = 30\%$, $t^{*} = 45\%$, $w^{d} = 15\%$, $t^{k^{*}} = 2.5\%$, $\alpha^{*} = 8\%$, $\delta^{*} = 10\%$, $\gamma^{*} = 0.75$, $\rho = 0.10$, $\phi^{*} = ½t^{k^{*}}$, $i = 7\%$.

CHAPTER 5
INCOME SHIFTING IN MULTINATIONAL ENTERPRISES WITH A CANADIAN PRESENCE

5-1. Introduction

For capital importing and exporting countries the taxation of MNEs is an important issue. One area of growing interest is a MNE's use of transfer pricing on cross-border charges to shift income between a foreign subsidiary and the parent corporation in an effort to reduce the MNE's global tax liability. When one entity of a MNE pays another entity for a good or services, the price used for the transaction is referred to as the transfer price. Transfer pricing is a completely legal and necessary activity for a MNE and there are several acceptable methods of determining the arm's-length transfer price such as comparable uncontrolled price or cost-plus pricing.[1] While there are preferred methods given the circumstances of the transaction, these methods can arrive at different prices, and the MNE can benefit if one method is chosen over another.

With the globalisation of the economy, more corporations are becoming multinational in nature. A large proportion of cross-border trade is done through MNEs thus increasing the importance of transfer pricing. There has been an increased interest in the behaviour of MNEs since transfer price manipulation can result in significant revenue impacts for governments. The MNE's profits attributed to one country can be increased or decreased depending upon the transfer price used. This affects the taxable income of the MNE and therefore affects the amount of taxes collected by each government.

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[1] Refer to section 2-3 for more details.

This chapter examines the income shifting behaviour of MNEs that have a presence in Canada. This presence can be in the form of the a Canadian-based MNE or a Canadian subsidiary of a foreign-based MNE. The key questions that we wish to answer are: (*i*) is there evidence that MNEs with a Canadian presence are shifting income to take advantage of international tax differences? and (*ii*) what is the direction and magnitude of the shift, if any, and are they consistent with theoretical predictions?

While international taxation, particularly the issue of double taxation, has received much attention in the literature,[2] there has been significantly less empirical research undertaken on income shifting. Where empirical research does exist, it predominantly focuses on US MNEs; little attention is paid to Canadian corporations. The lack of Canadian-based research is predominantly related to the lack of high-quality firm-level data. The unique data set utilised in our study allows us to overcome many of the issue relating to poor quality firm-level data.

Part of our research was undertaken at the Canadian Department of Finance, which provided us to access a very unique and untapped data set. The data set contains information collected on the annual T2 corporate tax returns filed by Canadian-based corporations and is supplemented with information from the tax schedules and financial statements that accompany the tax returns. While some of the information contained in the data set can be found in the financial statements of corporations, other data, such as the federal Part I tax liability, the capital consumption allowance claimed, and research and development expenditures, are not generally provided to the public by the corporation. This data set allows us to exploit a rich, high-quality, previously unused data source to examine an important taxation issue that has received little attention in Canada.

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2. For example, Musgrave (1969), Hamada (1966), Bond and Samuelson (1989), Gordon and Bovenberg (1996), and Giovannini *et al.* (1993). For more details, refer to Chapter 3.

We find that there is some evidence that MNEs with a presence in Canada are shifting income to subsidiaries located in low-tax jurisdictions. We also find that income shifting depends upon the size of the tax differential and that the effect of a one percent change in the tax differential is not constant across jurisdictions.

The remainder of this chapter is organised as follows. In section 5-2, we provide a brief review of the related literature.[3] We then develop the estimating equation used to empirically test the income shifting hypothesis in section 5-3. In sections 5-4 and 5-5 we discuss the unique characteristics of the data set that is used for the empirical estimation of the model and we provide some descriptive statistics of the corporations in our sample.

In section 5-6 we describe the econometric methodology used to undertake the estimation of our model and we report the results in section 5-7. In section 5-8 we provide an alternative model specification and we investigate the ability of this model specification to explain income shifting. While our results are generally consistent with the income shifting hypothesis, in section 5-9 we provide some possible explanations for some results that are contrary to the hypothesis. In section 5-10, we provide a brief comparison of the two empirical specifications. We discuss possible improvements to the model in section 5-11. Our conclusions are explained in section 5-12.

5-2. Literature review

Why may a MNE wish to manipulate transfer prices? Weichenrieder (1996) points to three reasons. First, there may be a desire to manipulate transfer prices due to the existence of tariffs on intra-firm trade. If tariffs are based on the price of a commodity, choosing a low transfer price can provide a tax savings. Second, differences in corporate tax burdens across countries may create incentives for transfer price manipulation. If a foreign subsidiary is located in a relatively high-tax jurisdiction, setting high transfer prices for purchases by the foreign subsidiary from a parent can increase global profits by causing the income in the low-tax jurisdiction to rise while decreasing the income in the high-tax jurisdiction since expenses are increased. While global taxable income is unchanged, the tax savings from reducing the taxable income of the foreign subsidiary exceeds the additional taxes paid by the parent on the taxable income shifted from the foreign subsidiary. These two reasons have received attention most notably by Horst (1971), Copithorne (1971), and Itagaki (1979, 1991) and Kant (1988, 1990).

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[3] The theoretical background to the empirical model is discussed in section 3-1.

A third reason for using transfer price manipulation to shift profits arises when the foreign subsidiary's profits are subjected to double taxation. The income of a foreign subsidiary is subject to taxation by the host country. When profits are distributed to the parent, the income will be subjected to taxation by the home country. If a credit is provided by the home country for foreign taxes paid on the income, double taxation is avoided. However, if a deduction system is used, double taxation will occur to some degree. Also, home countries that use a credit system usually provide a credit with limitation. The credit for foreign taxes paid is limited to the total home tax liability on that income; surplus foreign tax credits are non-refundable causing some degree of double taxation to occur.

In the remainder of this section, we review some of the recent empirical literature on income shifting. Some studies use aggregate data while others utilise firm-level data. A summary of the empirical studies is provided in Table 5-1.

5-2.1. Grubert and Mutti (1991)

Using aggregate data, Grubert and Mutti (1991) examine three inter-related aspects of US MNE activity. The first is the ability of MNEs to shift profits from high-tax to low-tax countries through transfer pricing. They also examine the impact of host country taxes and tariffs on the distribution of real capital and then examine the influence of these policies on trade patterns. We concentrate on their findings relating to transfer pricing.

Grubert and Mutti (1991) use cross-country aggregate data on the affiliates of US manufacturing MNEs from the US Department of Commerce 1982 Benchmark Survey. They estimate the after-tax profitability of US manufacturing affiliates using two measures of profitability. The first measure is the ratio of book income to sales net of any purchases from the parent. The sales of the affiliate are an approximation of affiliate activity since data on other material inputs is unavailable. The second measure is the ratio of book income to equity. It is thought that the rate of return on equity may be a better approximation to the return on investment in a given country.

Grubert and Mutti (1991) also include the GDP growth rate as an indicator of the economy-wide profitability of the affiliate on the basis that profitability is likely to be higher in countries where GDP growth is high. They also provide for the possibility that the relationship between tax rates and profitability may be non-linear. US MNEs can credit foreign taxes paid against their US tax liability. Since this can alter the incentives to shift income from high-tax to low-tax countries, MNEs may allocate a disproportionate amount of income in countries with the lowest tax rates. Therefore, Grubert and Mutti (1991) include the inverse of the foreign tax rate in their empirical estimates in an effort to allow for the potential concentration of income in the low-tax countries.

Grubert and Mutti (1991) find that foreign tax rates are a highly significant determinant of reported profits. They also find that regressions with the statutory foreign tax rate have more explanatory power than those with the average effective foreign tax rate except when GDP growth is included. Furthermore, while GDP growth is a significant determinant of general profitability, it appears to have little effect on the estimated role of taxes.

5-2.2. *Hines and Rice (1990)*

Hines and Rice (1990) use the 1982 Benchmark Survey data to examine US non-bank majority-owned foreign affiliates. In particular, they are interested in offshore tax havens, noting that US affiliates located in offshore tax havens account for more than 25 percent of US foreign investment, and almost one third of the foreign profits of US MNEs. Hines and Rice (1990) note that the use of foreign tax havens poses a problem for the sustainability of the US domestic tax base since income may be shifted to these locations. However, given that US MNEs are taxable on their world-wide income, the use of tax havens results in fewer foreign tax credits being applied against US tax liabilities and a smaller reduction in the total US tax liability compared to the reduction that occurs when subsidiaries are located in non-tax haven jurisdictions. The authors are specifically interested in the following issues: Are US MNEs that have foreign subsidiaries located in tax havens engaging in transfer pricing? Is there an explanation for why governments offer very low tax rates (*e.g.*, tax competition)? What are the implications for US government revenues when US MNEs locate foreign operations in these tax havens? We provide a brief summary of the transfer pricing component of the paper.

Hines and Rice (1990) find that if a tax haven increases its tax rate from zero percent to one percent, reported income in the tax haven would fall by seven percent. The effect of further one percent increases in the tax rate gradually decline. If the country ceased to be a tax haven and continued to increase its tax rates, increases beyond a rate of forty-five percent have no significant effect on reported income. From these results, the authors conclude that at lower tax rates, an increasing fraction of reported income in the tax haven represents income that is earned outside the tax haven but is attributed to the tax haven for tax purposes. Thus, there is evidence of income shifting through transfer pricing.

5-2.3. *Grubert, Goodspeed, and Swenson (1993)*

Tax rates, bases, and rules are not constant across countries. Therefore, MNEs will have a preference for reporting income in one country over another. Studies in the field of international income shifting attempt to quantify its significance.

A stylised fact of international investment that is evident in US aggregated data is foreign-controlled corporations operating in the United States report, on average, lower rates of return on investments than US corporations that are domestically controlled. Grubert, Goodspeed, and Swenson (1993) calculate that, in 1987, foreign-controlled corporations have a ratio of taxable income to assets of 0.58 whereas domestically-controlled corporations have a ratio of 2.14. Therefore, for a given level of assets, the foreign-controlled corporations are paying less in taxes than domestically-controlled corporations. Grubert, Goodspeed, and Swenson (1993) examine this stylised fact and hypothesise that income shifting is occurring through abusive transfer-pricing policies or through other methods of income shifting.

Unlike previous studies, Grubert, Goodspeed, and Swenson (1993) use firm-level data in their analysis. Their data includes all companies reporting assets of at least $50 million and is from the Statistics of Income Division of the Internal Revenue Service. The data includes a variety of corporate financial statistics. It also indicates whether fifty percent or more of the voting stock is owned by foreigners and the owner's country. The authors eliminate from their analysis all companies in the financial and real estate sectors, leaving cross-section data for 1987 on approximately 600 US-based foreign-controlled corporations and 4,000 domestically-controlled corporations. Data was available for 1980 to 1986. If a company was not part of the sample for each year, it was excluded from the panel data. The panel data includes approximately 1,300 domestically-controlled corporations and 110 US-based foreign-controlled corporations. Other data sets are used to link 291 of the US-based foreign-controlled corporations in 1987 with data on their parent corporations.

Grubert, Goodspeed, and Swenson (1993) begin by analysing the 1987 cross-section data, focusing on five specific issues: start-up and acquisition costs; debt and earnings stripping; country effects and the cost of capital; the ratio of income to sales as a dependent variable; and expense patterns. Since the late 1970s, much of the FDI in the US was in the form of acquisitions which Grubert, Goodspeed, and Swenson (1993) note can have a number of accounting and tax consequences which in turn affect the measured rate of return. One accounting consequence is a straightforward increase in the book value of assets, which in turn decreases the measured ratio of taxable income to assets. Further, if a firm maintains a given ratio of debt to assets, asset revaluation will increase interest expenses (since debt would have to increase to maintain the ratio), which results in a decrease in taxable income and taxes paid. Grubert, Goodspeed, and Swenson (1993) suggest, based on their analysis, that the revaluation of the book value of assets following acquisitions can account for about 25 percent of the difference in the profitability of foreign-controlled versus domestically-controlled corporations.

Using the pooled data, Grubert, Goodspeed, and Swenson (1993) undertake to examine the effects of the growth of the corporation over time and exchange rate effects. They find that the profitability of foreign-controlled manufacturing corporations rises over time relative to domestically-controlled corporations, suggesting that foreign-controlled firms may initially accept a lower rate of return. The effect of this rise in profitability explains about 25 percent of the difference in the ratio of taxable income to assets.

Finally, Grubert, Goodspeed, and Swenson (1993) indirectly examine the issue of transfer pricing by studying the distribution of the ratio of taxable income to assets. The authors hypothesise that taxable incomes should be concentrated around zero on the basis that large profits would be shifted from the US to lower-tax countries while large losses would be shifted from the US to higher-tax countries. The empirical tests suggest that the distribution of taxable income to assets in the cross-section data and in the pooled data is consistent with the expected pattern if foreign corporations are engaging in income shifting; foreign corporations tend to concentrate near a ratio of taxable income to assets of zero.

Grubert, Goodspeed, and Swenson (1993) find evidence of income shifting. However, they do not attribute the entire differential between the rate of return reported by CFCs and that of domestic-controlled corporations to income shifting; approximately half can be attributed to non-tax factors.

5-2.4. Harris, Morck, Slemrod, and Yeung (1993)

In a related study, Harris, Morck, Slemrod, and Yeung (1993) quantitatively assess the importance of income shifting in US MNEs. They try to ascertain whether or not taxes paid (measured as the ratio of either US sales or US assets) by US MNEs to the US government are related to the location of foreign operations.

Harris *et al.* (1993) use data from 1984 to 1988 on two hundred randomly selected US manufacturing firms from Compustat. Observations where the firm's current US tax liability is zero are dropped since these firms may face other income-shifting incentives that are unrelated to transfer pricing.[4] The dependent variable in their model is the firm's current US federal taxes payable net of investment tax credits. The dependent variable is then scaled by the size of US operations in part to allow for the interpretation of variations in the ratio that are due to income shifting, and in part to reduce heteroskedasticity. Harris *et al.* (1993) also include other variables to control for differences in firm characteristics that may affect the firm's profitability and tax situation. These variables include: research and development spending, advertising spending, depreciation and amortisation, rental expenses, investment tax credits, interest expenses, and the number of employees (intended to capture wage expenses which are not available).

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[4] It is interesting to note that Grubert, Goodspeed, and Swenson (1993) specifically examine the concentration of taxable income to assets near zero on the basis that such a concentration would suggest the presence of income shifting. This result would call into question the validity of the omission of these observations by Harris *et al.* (1993). Harris *et al.* (1993) do note that they get similar results when the zero tax liability observations are included in the analysis.

Harris *et al.* (1993) use dummy variables to categorise the firm's presence in high-tax and low-tax jurisdictions. They utilise five categories: regions with higher statutory tax rates than the United States; regions with lower statutory tax rates than the United States; extremely low-tax regions; regions affected by capital controls or other political concerns; and others. Within these five categories, countries are regionalised in an attempt to control for differences in the cost of income shifting; countries with similar tax rates as well as geographical proximity, similar business climates and tax enforcement regimes are grouped together. This results in thirteen dummy variables.[5]

The authors find that, over the five-year period of their data, the presence of a foreign subsidiary does affect the US tax liability as a fraction of either US sales or US assets. Further, the results are consistent with the hypothesis of income shifting. Corporations having subsidiaries in low-tax jurisdictions have lower US tax ratios and those having subsidiaries in high-tax jurisdictions have higher US tax ratios, implying income is being shifted from high-tax to low-tax jurisdictions to take advantage of tax rate differentials. Harris *et al.* (1993) find that the benefits of income shifting are more substantial when corporations have extensive multinational structures but for all MNEs, income shifting leads to only a moderate reduction in aggregate US tax payments. The authors also find that income shifting occurs for non-tax purposes such as avoiding capital controls and reducing political risk.

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[5] The regions are: Canada; Japan; Four Dragons (Hong Kong, South Korea, Singapore, and Taiwan); Rest of Asia; Low-tax Western Europe (Switzerland, Luxembourg, and Malta); High-tax Western Europe; Ireland; Australia and New Zealand; Latin America; South Africa; Tax havens (Andorra, Antigua, Bermuda, Bahamas, Barbados, British Virgin Islands, Cayman islands, Channel Islands, Cyprus, Gibraltar, Grenada, Kiribati, Liechtenstein, Netherlands Antilles, other Caribbean, St. Kitts-Nevis, St. Vincent, and Vanuatu); OPEC, and United States.

Harris *et al.* (1993) note that an initially surprising result is that the coefficient on the dummy variable for Canada is negative. During the sample period, Canada had statutory tax rates comparable, but slightly higher than the United States. Therefore, we expect a positive coefficient. Harris *et al.* (1993) rely on the results of Glenday and Mintz (1990) to explain this anomaly. Glenday and Mintz (1990) note that many Canadian corporations were in a surplus tax loss situation during the period before and during the sample. Thus, the effective marginal tax rates are lower than the statutory corporate tax rates; the same explanation is applied to Australia and New Zealand.

5-2.5. Jog and Tang (1998)

Jog and Tang (1998) investigate if changes in the relative tax rates between the United States and Canada had an impact on the debt levels of Canadian corporations that are part of a MNE. If relative tax rates do affect the debt levels, then debt shifting can provide an explanation of significant changes in Canadian corporate income tax revenue during the 1984-1994 period.

In particular, Jog and Tang (1998) compare the capital structure of Canadian controlled corporations without foreign affiliates with that of Canadian corporations that are controlled by US or other foreign corporations. By increasing the debt of a Canadian corporation with foreign affiliates, the Canadian corporation can deduct the interest expense, thereby reducing the Canadian tax liability. The global tax liability can be reduced if the interest deductions are taken in the higher tax jurisdictions.

Jog and Tang (1998) find that the Canadian corporate tax rate has a significant impact on the Canadian debt-to-equity ratio and also found that the Canada-US tax differential has a positive impact on the ratio. This suggests that a Canadian corporations that are part of a MNE shift income through their financing decision.

Our study does not specifically examine income shifting through the corporation's financing decision. However, we attempt to control for this income shifting behaviour by including the debt-to-asset ratio as a control variable.

5-3. The model

It is difficult to directly observe income shifting. To be able to empirically test the predicted income flows from the theoretical models outlined in section 3-1, we adopt an indirect approach based on a model by Harris *et al.* (1993). This model also is similar to the approaches of Hines and Rice (1990) and Grubert and Mutti (1991).

Let a MNE's current Canadian tax liability be defined as

$$T^C = \tau^C R^C \tag{5.1}$$

where τ^C is the Canadian statutory corporate tax rate and R^C is the Canadian reported taxable income. Assuming a linear tax function, R^C can be decomposed as follows:

$$R^C = Y^C - Y_L^C + Y_H^C \tag{5.2}$$

where Y^C is the actual Canadian income earned on domestic operations, Y_L^C is income shifted from a Canadian subsidiary to subsidiaries in low-tax jurisdictions, and Y_H^C is income shifted to the Canadian subsidiary from high-tax jurisdictions. We can then define the total Canadian tax liability as

$$T^C = \tau^C \left(Y^C - Y_L^C + Y_H^C\right) \tag{5.3}$$

The benefit of this specification is that T^C is actually reported to tax authorities.

Now assume that the relationship between T^C and a MNE's presence in a high-tax or a low-tax jurisdiction relative to Canada reveals information about Y_L^C and Y_H^C. It is this revealed information that will be used to either confirm or refute income shifting. For example, if the MNE has a presence in a low-tax jurisdiction, we expect the Canadian tax liability to be lower since income will be shifted to the low-tax jurisdiction, suggesting a higher value of Y_L^C. Conversely, if income is shifted to Canada from a high-tax jurisdiction, Y_H^C should be higher and the Canadian tax liability should be higher. Therefore, the location of foreign operations should reveal information about Y_L^C and Y_H^C.

We assume the location decision is exogenous and independent of any income shifting decision. This is merely a simplifying assumption and not a statement of fact. We utilise locational dummy variables to indicate if a MNE has a subsidiary in a particular foreign jurisdiction. We then interact the locational dummy variables with the difference between the statutory tax rate in the foreign jurisdiction and the Canadian statutory tax rate that is applicable to the corporation in our sample. We try to explain the Canadian tax liability by utilising this tax differential and MNE locational information.

The estimating equation is:

$$\left(\frac{T^C}{A^C}\right)_{ft} = \alpha\left(\Delta\tau_t \mathbf{d}_{ft}\right) + \beta\mathbf{C}_{ft} + \varepsilon_{ft} \tag{5.4}$$

where T^C is the Canadian tax liability, A^C is total book value of Canadian assets, and f and t are firm and time subscripts; $\Delta\tau_t$ is a vector of statutory tax differentials between foreign jurisdictions and Canada, $\tau_t^* - \tau_t^C$; $\mathbf{d}_{ft}$ is a vector of locational dummy variables for firm f in period t. The tax differential vector is interacted with the locational dummy variable such that the product is zero when there is no subsidiary present in the jurisdiction and the product is equal to the tax differential when there is a subsidiary present in the jurisdiction. We include control variables in **C** including the capital consumption allowance (CCA), interest expenses, rental expenses, salary expenses, scientific research and experimental development (SRED) expenditures, investment tax credits, total debt, use of loss carryforwards, along with dummy variables for industry classification and location of parent corporation.; α and β are vectors of regression coefficients and ε_{ft} is a well-behaved error term. Note that

α and β are assumed to be the same for all firms and all time periods. All financial data included in **C** are scaled by A^C.

The tax differential is calculated as the difference between the statutory tax rate in the foreign jurisdiction and in Canada. Therefore, if the foreign jurisdiction has a lower statutory tax rate, the tax differential is negative. The income shifting hypothesis involves testing if the components of α are positive. This tests presumes that having a subsidiary in a high-tax country induces the MNE to shift income to Canada, increasing taxable income and the Canadian tax liability while operating in a low-tax country induces a shift of income in the opposite direction and will lower the Canadian tax liability. If the tax differential is positive, the Canadian tax rate is lower and income should be shifted to Canada thus increasing the Canadian tax-to-asset ratio. If the tax differential is negative, the foreign tax rate is lower and income should be shifted to the foreign jurisdiction, thus reducing the Canadian tax-to-asset ratio. Therefore, regardless of the sign of the tax differential, the coefficient, α, should be positive to be consistent with the income shifting hypothesis.

While Harris *et al.* (1993) utilise locational dummy variables to investigate income shifting, they ignore the tax differentials and they group countries into high-tax and low tax regions based on geographic location. There are two key benefits to our specification. First, we can examine the effect on the tax-to-asset ratio of having a subsidiary in a particular jurisdiction. Second, and unlike Harris *et al.* (1993), we can determine the change in the Canadian corporation's tax-to-asset ratio that results from changes to the tax differential. The ability to examine the effect of changes in the tax differential provides us with an important tool for tax policy analysis.

5-4. Data

5-4.1. Financial and taxation information

Taxation and other financial data were obtained from the Corporation Sample File which was created by the Corporation Statistics and Modelling Sector of Revenue Canada to allow Finance Canada to undertake detailed analysis of corporation financial statements and tax-related activity. The data file consists of information collected on annual T2 corporate tax returns filed by Canadian-based corporations and is supplemented with information from the tax schedules and financial statements which accompany the tax returns.

The Corporate Sample File includes a few hundred large Canadian-based corporations that were in existence continuously from 1987 to 1994 and is sampled from a population of over 750,000 Canadian-based corporations of all sizes. We eliminate those corporations that are not entities of a MNE. We also eliminate from our sample those corporations that are missing observations for some years for some variables.[6] Our final sample consists of 94 large Canadian-based corporations[7] with multinational operations, either as the parent corporation or as a subsidiary of a MNE.

The uniqueness of the data set deserves further comment. The financial and taxation data have been obtained by Finance Canada on a confidential basis from Revenue Canada. The data comes from the T2 corporate tax filings of the corporations in our sample. While some of the information contained in the data set can be found in the financial statements of the corporations, other data, such as the federal Part I tax liability, are not publicly available. Further, almost one-half of the corporations in our sample are private corporations whose financial and tax information would not normally be available in the public domain.

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[6] Missing observations arise because corporations may not provide some information on the tax returns and in their financial statements that are filed as part of their tax return. For example, if a corporation only has income from Ontario and all its employees are in Ontario, it will pay provincial taxes only in Ontario. Since the country-wide distribution of its salary and wage expenditures is not necessary for determining how much of its taxable income is attributed to each province, the corporation may not report salary and wage expenditures, and they may be included as other expenditures on the financial statements, thus resulting in a zero value in the database for wages and salary expenses.

[7] Revenue Canada designated a corporation as large based on total assets and the primary industry. There is not one asset value that must be exceeded for a company to be considered large; each industry had its own threshold. However, all the companies in our sample have assets exceeding $8 million in all years with the average assets exceeding $1.3 billion.

More importantly, the data set contains unconsolidated financial data. In Canada, public corporations are permitted to provide shareholders with consolidated financial statements; the operations of all subsidiaries within the enterprise are reported as one with the parent corporation. Our unconsolidated figures permit a more accurate analysis of the income shifting behaviour since we have data on the Canadian domestic operations. As a comparison, Harris *et al.* (1993) use the US federal tax liability as the dependent variable, but the control variables in **C** are world-wide consolidated figures because a geographic breakdown of these variables was not available. This is perhaps a short-coming of the Harris *et al.* (1993) analysis. Since we have unconsolidated figures, we can focus on the operations of the individual corporation and not have our results affected by the operations of other entities within the corporation. For example, if the MNE has high interest expenses on a consolidated basis, it may not be due to high debt levels and interest costs in the Canadian subsidiary. Thus, while Harris *et al.* (1993) control for interest expenses, they are not controlling for the interest expenses that are directly related to the taxable income variable and thus the tax liability of the corporation in their sample; our data allows us to overcome this problem.

5-4.2. The ownership structure of the MNE

To undertake the estimation of our model, we must know the location of all foreign entities of the corporations in our sample. We determine the ownership structure of each corporation for each year of our sample using various issues of *Who*

Owns Whom. This publication provides a detailed list of the names and country of incorporation for thousands of corporations and their world-wide subsidiaries.

The Canadian-based corporations in our sample are multinational in nature; either they are the parent corporation of the MNE, or they are a subsidiary that is controlled by the MNE. Since we are interested in examining income shifting, we do not care if the Canadian-based corporation in our sample is the parent or simply one entity within the MNE since income shifting can occur between either corporation. However, we do account for the location of the parent in our empirical estimation to see if Canadian-based MNEs behave differently from US-based MNEs or MNEs with parents elsewhere in the world.

To determine where all subsidiaries of the MNE are located, we consult *Who Owns Whom* to find the name and country of incorporation of the parent corporation for every Canadian-based corporation in our sample. Next, we determine the countries where the parent corporation's subsidiaries are located; included in this list is the Canadian-based corporation in our sample.

We limit the ownership structure to include only the subsidiaries of the MNE. A corporation is considered to be a subsidiary if another corporation owns more than fifty percent of its share capital. Therefore, the subsidiary is controlled by the other corporation. We ignore foreign affiliates (ownership between 10% and 50%) and trade investments (less than fifty percent ownership and held for investment purposes only) because the MNE cannot exert the same degree of power over the operations of these entities, thus significantly reducing the incentives to shift income between entities.

5-4.3. Corporate tax rates

To determine the corporate tax rates that a subsidiary faces, we utilise various issues of *Corporate Taxes: A Worldwide Summary* by Price Waterhouse. For each year from 1988 to 1994 and for each country where a subsidiary of the MNE exists, we collect the tax rate applicable to foreign-owned subsidiaries. Since corporate tax systems are often complex with many different tax rates often applied by multiple jurisdictions within each country, we adopted some rules for determining the appropriate tax rate.

We choose the tax rate that applies to income attributable to the host country. Surtaxes are included provided the surtax is income based. We ignore taxes on non-income items such as capital taxes. If a country imposes a minimum tax payable based on net worth or some other non-income measure, we ignore this rate and assume the tax liability based on the corporate tax rate on income will exceed this alternative minimum tax calculation. We also ignore value added taxes and other non-income based taxes such as payroll taxes. While these taxes may be an important factor in determining whether or not a subsidiary should be incorporated in a foreign jurisdiction, once a corporation has incorporated in the jurisdiction, it is not possible to avoid these taxes through income shifting. Many tax holiday rates and other speciality tax rates are also ignored particularly since these rates typically are applicable only for a short time period and typically do not last for more than ten years. In some countries where it is clear that the tax holiday is long term and can have a lasting effect on income shifting (e.g., Ireland and Singapore), tax holidays are accounted for in the tax rate that we use in our analysis.

If the tax system is progressive, we choose the highest rate since the corporations in our sample are large corporations and we assume the subsidiary is large enough that this higher tax rate is most likely to be the applicable rate.[8] When income-based taxes can be applied by multiple jurisdictions, we include these sub-national rates in our calculations. In some cases, it is difficult to determine an exact sub-national tax rate applicable to the income because multiple sub-national jurisdictions may impose different rates. In this case, we take the average sub-national rate unless it is possible to determine a "typical" rate. For example, from 1991 through 1994, Portugal imposed a surtax ranging from 10% to 39.6% of the corporate income tax liability. Since the 10% rate is the typical rate,[9] we use this rate in our calculations. If there was no typical rate, we would have used the average, 24.8%. When different tax rates apply to different types of corporations, we take the average rate unless there is a compelling reason to choose one rate over the other.

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[8] In many cases, the top rate applies at relatively low income levels (sometimes as low as a few hundred thousand dollars) so even if the subsidiary is not large, it is not unreasonable to expect that the highest tax rate will apply.

In the countries where multiple tax rates apply to corporate income, care is taken to ensure that the appropriate tax base is used. For example, in 1994, the Canadian federal tax rate for non-manufacturing corporations was 38% with a 10% abatement to provide the provinces with room to tax corporations. This resulted in a net federal rate of 28%. The typical provincial rate was assumed to be the Ontario rate of 15.5% resulting in a total rate of 43.5%. Notice that the provincial tax liability was not deductible for federal tax purposes. A further 3% surtax calculated on the base amount of the federal tax reduced by the provincial abatement (*i.e.*, the base is the net federal rate) was imposed, resulting in an additional tax of 0.84% of taxable income. Therefore, the non-manufacturing rate for Canada in 1994 was 44.34%.

Withholding taxes and tariffs are ignored. Withholding taxes on dividends are not included because this tax is related to the repatriation of after-tax income and not before-tax income. The withholding taxes on other items such as royalties and interest expenses are also ignored. While these expenses are obvious channels whereby income shifting occurs, the rates are typically low. When tax treaties exist between countries, the rate is typically 15% or less. Since withholding tax rates are low, and the home country will generally have double-taxation relief provisions, the withholding tax rate will be less important. Further, many cross-border charges, such as management fees, are rarely subject to any withholding taxes, thus further reducing the significance of these taxes. Finally, we do not have sufficient data to accurately measure the withholding tax rates that apply to each corporation. To do so, we need to know the volume of cross-border charges by type (*e.g.*, management fees, royalties, and interest expenses) so that the applicable withholding tax on all these transactions can be calculated.

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[9] This is the typical rate according to *Corporate Taxes: A Worldwide Summary*.

Finally, to determine which countries are considered tax havens, we consulted Diamond and Diamond (1995). This was done because *Corporate Taxes: A Worldwide Summary* does not contain information for all tax havens in the world.

5-4.4. Variables used to estimate the model

Some MNEs in our sample have subsidiaries in only a few countries while others have subsidiaries in almost one hundred jurisdictions. Across the entire sample, there are subsidiaries in about one hundred and fifty different countries. Estimation with this many locational dummy variables would be burdensome and would significantly reduce the degrees of freedom available to us. Therefore, the vector of locational dummy variables, $\mathbf{d}_{p}$, only includes those countries where at least one-quarter of the corporations in our sample have a subsidiary. We also group all tax havens together since almost two-thirds of the MNEs in our sample have a subsidiary in at least one tax haven.[10] This approach to the locational dummy variables allows for a more feasible estimation since we are left with only eighteen jurisdictions.

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[10] Tax havens include: Bahamas, Bahrain, Barbados, Belize, Bermuda, Cayman Islands, Channel Islands, Cook Islands, Cyprus, Djibouti, Gibraltar, Grenada, Guernsey, Isle of Man, Jersey, Lebanon, Liberia, Liechtenstein, Macau, Netherlands Antilles, Panama, Seychelles, United Arab Emirates, United Kingdom Virgin Islands, and Western Somoa. The designation "tax haven" is based on the tax rate and other features of the tax system. Generally, if a country has a tax rate below 20% it is considered to be a tax haven. Other important features that must be taken into account when designating a country as a tax haven are: banking privacy and privacy accorded to financial holdings and dealings, the absence (or minimal) government controls, the ability to shift investments without being taxed, and the availability of flexible provisions for inheritance. For more details, refer to Diamond and Diamond (1995).

Part I federal tax payable is used as the tax liability in our model. This amount takes into account the federal corporate income tax and the federal surtax less the provincial abatement and deductions such as the manufacturing and processing credit and foreign business and non-business income tax credits. We do not include Part IV federal taxes payable since these taxes relate to dividends repatriated from the after-tax income of the subsidiary; income shifting will occur before these dividends are issued. Provincial tax liabilities are excluded since we do not have this information in the database. Because the tax base for provincial taxation is essentially the same as the federal tax base, adding the provincial tax liability would not result in a significantly different relationship between tax liability and the independent variables in our model.

We include eight tax-related variables in **C** along with dummy variables for industry and location of parent corporation. The tax-related variables are unconsolidated figures for the Canadian-based corporation that is part of the MNE. The variables include six expense categories: CCA, interest expenses, rental expenses, salary and wage expenses, SRED, and use of loss carryforwards. The two non-expense variables are investment tax credits, and debt leverage which is measured as total debt divided by total assets.

The variables in **C** have some tax consequences that should affect tax liabilities. While the CCA, interest expenses, and rental expenses should reduce tax liabilities, the effects of SRED and salary are less clear. Morck and Yeung (1991, 1992) note that research and development spending may act as a proxy for the presence of production-enhancing intangible assets such as know-how. The same could hold true for salary as high salary expenses could be a proxy for intangible assets such as a highly skilled employees or exceptional management. If these variables do capture the existence of intangible assets, it is possible for the sign on some coefficients in **C** to be positive.

The debt leverage variable includes both short-term and long-term debt obligations. This variable is intended to capture the effects of the type of financing chosen by the MNE. A subsidiary that is financed by high amounts of debt will have higher interest expenses and lower taxable income. By altering the amount of debt financing that a subsidiary has, the MNE can affect its global tax liability. A subsidiary located in a high-tax jurisdiction has an incentive to finance its operations by issuing debt because the interest cost on the debt are deductible for income tax purposes, thus providing a larger tax savings than if the parent corporation, located in a lower-tax jurisdiction, borrows funds locally to inject equity into the foreign subsidiary.

We are interested in capturing the income shifting that occurs through transfer pricing and not through financing decisions. The debt leverage variable is intended to try to control in part for the different financing decisions that corporations may make. We expect the coefficient on the debt leverage variable to be negative, suggesting that higher debt to asset ratios result in lower tax liabilities. With the debt leverage variable helping control for financing decisions, the locational dummy variables should be predominantly capturing the non-financing components of lower tax liabilities, namely the ability to shift income through transfer pricing.

Rental expenses include expenses for the renting of real estate and other items such as machinery. The rental expense control variable is intended to capture the fact that some corporations may own a large amount of property, plants, and equipment, while other companies may lease the same equipment.

Salary and wage expenditures do not include expenses for employee benefits such as medical insurance. The salary control variable is intended to reflect differences in the capital-labour ratio among companies. Also, as noted above, it may capture the presence of intangible assets such as a strong management team or employee know-how. Finally, total assets which is used to scale the financial variables is the sum of current, fixed, and financial assets as reported by the corporation.

In addition to tax data, the Corporation Sample File also contains descriptive information about each corporation. We utilise the primary SIC code to determine which of twelve major industries is the corporation's primary industry of operations. We also know the type of corporation (*e.g.*, private or public) and we utilise information on whether or not the corporation undertakes any manufacturing and processing business.

The distinction between a manufacturing and non-manufacturing corporation is important in our sample since Canadian manufacturing corporations are taxed at a lower rate than non-manufacturing corporations. A corporation is classified as a manufacturing corporation if it qualifies for the manufacturing and processing credit and the corporation's manufacturing operations represent at least 50% of its operations over the entire sample period. Most corporations that qualify for the credit have significantly more than 50% of their operations attributed to manufacturing and processing.[11]

Our sample consists of 94 Canadian-based corporations that are part of a MNE and covers the period 1987 to 1994. All financial variables in the model are scaled by the total book value of Canadian assets. This is done to help reduce the degree of heteroskedasticity and to make it easier to compare results across corporations.

5-5. Descriptive statistics

Prior to estimating our model, we provide some basic financial and non-financial characteristics of the corporations in our sample. Table 5-2 summarises the ownership structure, the location of the parent corporation, and if the corporation is classified as a manufacturing and processing corporation. We can see that 47.9% of the corporations in our sample are privately owned (*i.e.*, no shares are publicly traded, although it is not necessary that only one corporation owns the shares), 36.2% are public corporations (*i.e.*, at lease some shares are publicly traded), and the remaining 16.0% are classified as other. This last group includes corporations whose status changed during our sample period, and it includes corporations who, prior to 1989, were private corporations that were owned by a public corporation; since 1989 these corporations were classified as private corporations.[12] It is interesting to note that none of the private corporations have a Canadian parent.

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[11] To determine the percentage of a corporation's operations that are attributable to manufacturing and processing, we take the total manufacturing and processing credit that the corporation receives (as a percentage of the total tax liability) and divide this amount by the maximum credit rate that is available. From 1987 to 30 June 1990 the maximum credit was 3%. From 1 July 1990 to 30 June 1991 the maximum credit was 4%. From 1 July 1991 to 31 December 1993 the maximum credit was 5%. In 1993 the maximum credit was 6% and in 1994 the maximum credit was 7%. For years when the rate changed in mid-year, the average rate was used.

The largest proportion of corporations, 42.6%, either have a Canadian parent corporation or are the Canadian parent corporation while only 25.5% have a parent in the United States. The remaining parent corporations are located in the rest of the world (28.7%) or had the location of their parent corporation change due to a merger or acquisition (3.2%). Also, 37.2% of the corporations in our sample are classified as manufacturing and processing corporations.

Table 5-3 provides an idea of the range of industries represented by the 94 corporations. This classification is based on the primary SIC classification code that the corporation provides to Revenue Canada with their corporate income tax return. There is a broad representation of industries in our sample, although almost two-thirds of the corporations fall into one of natural resources (16%), heavy industry and machinery (20%), financial companies (11%), and wholesale trade (24%).

On the financial side, Table 5-4 provides some averages of major financial variables for our 94 corporations. These averages are the average for all 94 corporations over the entire sample range, 1986 to 1994. The average corporation in our sample has assets in excess of $1,300 million and produces an annual revenue of

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12. The classification is done by Revenue Canada and from 1989 to present, the private corporations that are owned by public corporations are included in their own category.

over $800 million. The average debt load is over $500 million with interest expenses approaching $55 million. The average firm also undertakes over $6 million in research and development and receives an investment tax credit of over $1 million representing an average investment tax credit rate of approximately 18%.[13] The average taxable income is almost $27 million and the average federal tax liability is over $6 million. This tax liability is only 23% which is lower than the average federal tax rate during the period of our sample. The average tax liability is not equal to the statutory level because some corporations paid no taxes in some years.[14]

Table 5-5 provides an indication of the distribution of taxable income and tax liabilities over the entire sample period. The deciles are determined by asset value and the average asset value is included in the table. Taxable income increases by decile except from the fourth to fifth deciles and the eighth to ninth declines. We do not know the characteristics of the corporations in these deciles (*e.g.*, the percentage of corporations that are manufacturing corporations) so we are unable to provide any explanation as to why these decreases occur. The federal Part I tax liability also tends to increase overall with decreases occurring again between the fourth and fifth deciles and the eighth and ninth deciles. In the ninth decile, the average taxable income is lower and the average tax liability is lower. It is possible that more corporations in this decile experienced losses, thus reducing the overall taxable income, and reducing the average taxable income and average tax liability. Table 5-6 shows that public corporations have nearly three times the assets of the private corporations in the entire sample yet the revenues are not noticeably different. The salary expenses for public corporations are higher but the ratio of salary expenses to total assets is slightly lower for the public corporations. The public corporations have almost double the debt load of private corporations, but when compared to total assets, the private corporations have a debt to asset ratio that is 1.34 times larger. Further, the public corporations are undertaking considerably more research and development than private corporations. The private corporations have slightly lower taxable income and tax liability, but the average tax rate is comparable.

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[13] The investment tax credit rate is 20% of *qualifying* research and development expenses which may not always equal actual research and development expenses, and in some cases a corporation may not need to claim the entire investment tax credit to eliminate its tax liability.

[14] The average federal Part I tax rate during the sample period is approximately 30% for non-manufacturing corporations and approximately 25% for manufacturing corporations.

The financial statistics for the entire sample for corporations based on the location of the parent corporation are outlined in Table 5-7. The corporations with Canadian and US parents are relatively close in asset size whereas a corporation with a parent located in another country is only 16% the size of the average company in the entire sample. Despite similar asset levels, the corporations with a Canadian parent have only slightly more than one-half the total revenue of the corporations with a US parent. Further, those corporations with a parent located elsewhere have about 50% the revenue of the corporations with a Canadian parent.

The corporations with a US parent have higher debt levels but a comparable debt-to-asset ratio to the corporations with a Canadian parent. Interestingly, the corporations with a parent located in another country carry much less debt and the debt-to-asset ratio is about 30% less than the corporations with Canadian and US parents.

It appears from Table 5-7 that Canadian corporations with US parents undertake the majority of research and development of the corporations in the sample and that corporations with a parent located in another country undertake virtually no research and development through the Canadian subsidiary.

The taxable income of corporations with a US parent is much higher, although this is related to the higher amount of income generated by these corporations compared to the rest of the sample. There is a corresponding higher tax liability of the corporations with a US parent, but the average tax rate is slightly lower at only 22%

compared to 24% for corporations with a Canadian parent and 25% for corporations with a parent located elsewhere.

Table 5-8 outlines the financial statistics for manufacturing and non-manufacturing corporations for the entire sample period. The two sub-samples have similar asset levels, but the revenue of manufacturing corporations is 2.7 times larger. However, the salary expenses and depreciation expenses are much higher for manufacturing corporations. Taxable income is higher for manufacturing corporations and so is the federal tax liability. However, the average tax liability is lower for manufacturing corporations because they pay a reduced tax rate on manufacturing activities.

Table 5-9 indicates the location of foreign subsidiaries of the multinational associated with our Canadian-based corporation over the entire sample period. The average tax-to-asset ratio and average statutory tax rates are also included for each country. By far the most popular subsidiary locations are the United States and the United Kingdom with 95% and 72% of the MNE's having subsidiaries in these countries. Of the remaining countries, over one-half of the MNEs have subsidiaries in tax havens, the Netherlands, Australia, Germany, and France. The tax rates in the countries ranges from zero in the tax havens to as high as 58.9% in Germany.

There seems to be some evidence from Table 5-9 that MNEs with subsidiaries located in lower-tax jurisdictions have slightly lower tax-to-asset ratios. MNEs with subsidiaries in tax havens, Hong Kong, Singapore, and Ireland have the lowest tax-to-asset ratios. However, some corporations in high-tax jurisdictions have lower than average tax-to-asset ratios and some corporations in low-tax jurisdictions have higher than average tax-to-asset ratios.

Table 5-10 indicates, over the entire sample period, the percentage of corporations with a presence in each location with a distinction made between private and public corporations, the location of parent corporation, and manufacturing and non-manufacturing corporations. The breakdown of the locations of the subsidiaries will be important to keep in mind when discussing the results of our model estimation. For example, if the results suggest income shifting occurs in the opposite direction to that expected, it is less critical if the inconsistency is with the coefficient on New Zealand where only 26% of the MNEs have subsidiaries than if the inconsistency was with the coefficient for the United States where 95% of the MNEs have a subsidiary.

We can see from Table 5-10 that private corporations have a much more extensive multinational structure than public corporations. The same holds true for MNEs with a US parent or a parent in the rest of the world; the Canadian-based MNEs typically have a subsidiary in the United States and just over one half have subsidiaries in the United Kingdom, but there are not many Canadian-based MNEs with an extensive multinational structure. Finally, there does not appear to be much difference in the multinational structure of manufacturing and non-manufacturing corporations.

5-6. Econometric methodology

We have 94 individual cross-section units (corporations) in our sample. As Kmenta (1996) notes, it is frequently assumed in cross-sectional observations that the regression disturbances are mutually independent but heteroskedastic.[15] Since our sample covers an eight-year time period, it is also possible for the disturbances to be autoregressive. Testing for heteroskedasticity and autocorrelation suggested both are present. We therefore estimate the model using a cross-sectionally heteroskedasticity and time-wise autoregressive specification as described in Kmenta (1986, chapter 12). This specification starts by applying ordinary least squares to all observations. The resulting estimates are used to obtain firm-specific consistent estimates of ρ_i and σ_i. The observations are then transformed using the variance and autocorrelation estimates. The model is now re-estimated using the transformed observations and the new disturbances are asymptotically non-autoregressive and homoskedastic.

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[15] It is possible that a shock that affects one corporation could affect another corporation in the sample, thus resulting in cross-section dependence. In this case, the off-diagonal terms in the covariance matrix will be non-zero. However, in order to estimate the model under the assumption of cross-section dependence, it is necessary to have more time observations than cross-section units. In our sample, we have only 8 years of observations for 94 corporations. Thus, our estimation cannot take into account cross-section dependence.

Next, we utilise a generalised method of moments (GMM) estimation described in Davidson and MacKinnon (1993, Chapter 17).[16] GMM estimation allows us to incorporate instrumental variables to appropriately deal with the potential endogeneity of some right-hand side variables in our estimating equation.

Of the eight control variables, we believe that five may be endogenous: CCA, interest expenses, investment tax credits, salary expenses, and use of loss carry-forwards. We use current period depreciation expenses as an instrument for the CCA, and we use one-period lagged values of interest expenses, investment tax credits, salary expenses, and use of loss carry-forwards for the other four instruments. Our rationale for the potential endogeneity of these variables is as follows.

Unlike depreciation expenses which are simply an accounting entry for the corporation, the CCA is the tax-related deduction that the corporation is allowed to claim for the depreciation of capital. While depreciation can be accounted for in every year, the corporation may decide not to claim the CCA since the corporation may be able to reduce its taxable income to zero without using this deduction. In fact, some of the corporations in our sample did not claim any CCA for some years, while every corporation claimed depreciation expenses. Therefore, we can think of the CCA deduction as a choice variable for the MNE.

Suppose interest rates rise. Any new debt issues and any maturing debt that must be refinanced will be affected by the interest rate changes. Since rising interest rates suggest a change in the business cycle, the overall profitability of the corporation can be affected. Therefore, interest rate changes may affect both interest expenses and tax liabilities.

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[16] See Appendix 2 for a brief explanation of the GMM estimation technique.

Investment tax credits of 20% of eligible SRED expenditures can be claimed for tax purposes. As with the CCA, investment tax credits can be a choice variable for the corporation since it may not be necessary to claim the credit in a given year due to having already eliminated the tax liability. Within our sample, there are some cases where the investment tax credit exceed annual SRED expenditures by more than 20% because the SRED is not claimed in the previous year, and in some years, less than the full 20% credit is claimed.

Salary expenses could be endogenous. If a negative GDP shock hit the economy, the overall profitability of the corporation could be affected. Salary expenditures are one expense that could be quickly adjusted through layoffs thus affecting the tax liability.

Losses from previous years can be carried forward for up to seven years or carried back for up to three years. The use of these losses to reduce taxable income in a given year is at the discretion of the corporation. For example, the corporation may be able to reduce its tax liability to zero by using other deductions that cannot be carried forward.

Finally, US companies may not claim deductions or loss carryforwards even though they may be paying taxes because they want to significantly increase their foreign tax credits on dividends in order to offset tax liabilities on other sources of income remitted to the United States.[17]

Of the remaining three control variables, the case for endogeneity is not as strong. Rental expenses are related to the leasing of property and equipment. Since most lease agreements would be for multiple years, it is less likely that shocks to GDP that would affect profitability and the tax liability would immediately show up as a change in rental expenses; a lag of at least one year would not be unlikely. SRED expenditures are generally longer-term expenditures and will also be less susceptible to quick changes due to a changing economy.

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[17] See Glenday and Mintz (1990) for more details on this issue.

Finally, perhaps short-term debt may adjust relatively fast due to a changing economy, but long-term debt levels are not likely to change as quickly. While a company may renegotiate their debt, and in a positive economic climate may decide to undertake additional financing for new projects, the response to a changing economy will not likely be instantaneous and a one-period lag would not be unreasonable. While the debt level will be an endogenous variable for the corporation, the effect of the endogeneity in the estimation will not be crucial since there is likely a lagged response to a changing economic climate. Also, the corporations in our sample are very large multinational corporations and it is unlikely that significant changes to their financial structure will occur instantaneously. Finally, our data does not include information about the maturity of the debt.

5-7. Estimation results

5-7.1. Estimation results for the entire sample

The estimation results are summarised in Table 5-11. We initially estimate the model using an OLS cross-sectionally heteroskedastic and time-wise autoregressive specification without correcting for autocorrelation. However, the Durbin-Watson test statistics in all specifications suggested an AR(1) correction was warranted.

The GMM estimation deals with the endogeneity of right-hand side variables. Due to the presence of heteroskedasticity and autocorrelation, we use a heteroskedastic autoregressive consistent (HAC) weighting matrix. The lag length for the GMM estimation is one. The results of the GMM estimation are reported in Table 5-11.

While we only report results from one OLS and one GMM specification, we did try alternative approaches. We looked at a simple OLS specification, a fixed-effects model, and a random-effects model. However, even after the financial data were scaled by total assets, tests suggested that there was a heteroskedasticity problem. This led us to use an OLS cross-sectionally heteroskedastic time-wise autoregressive specification. The possibility that some right-hand-side variables may be endogenous led us to use the GMM specifications.

For the OLS specification, the results are mixed. The coefficients for twelve countries are significant while the coefficients for six countries are not. Further, five coefficients are significantly negative, a result that is inconsistent with the income shifting hypothesis. When the GMM specifications are used, the results improve to some degree. We find that the coefficients for Belgium, France, Hong Kong, Ireland, Japan, the Netherlands, Singapore, and the United Kingdom are all significantly positive, while the coefficients for Brazil, Germany, Spain, New Zealand, the United States, and the tax havens are significantly negative.[18]

In both the OLS and GMM specifications, the CCA, salary expense, SRED, loss carry-forward use, and leverage coefficients are all significant. The significance of the leverage control variable is important because this variable is intended to control for the financial structure of the corporation. In the GMM specification, rental expenses are also significant.

We conduct a Hausman test with the GMM specification to determine if our hypothesis about the potential endogeneity of some right-hand-side variables is correct. The Hausman test statistic was over five hundred, which far exceeded the critical value of about six. We conclude that endogeneity is an issue that must be addressed in the estimation procedure. Therefore, the GMM specification provides superior estimates.[19]

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[18] The coefficients for the tax havens, the United States and Spain have the incorrect sign in both the OLS and GMM specifications.

The magnitude of income shifting

Next, we focus on the magnitude of income shifting that may be present. We consider two effects: (*i*) the effect of an existing MNE adding a subsidiary in a jurisdiction; and (*ii*) the effect of changes to the tax-rate differential. The effect on a Canadian corporation's tax-to-asset ratio when a MNE creates a subsidiary in a foreign jurisdiction will depend upon whether or not the Canadian corporation is a manufacturing corporation or a non-manufacturing corporation since the Canadian statutory tax rate is different for these two types of corporations. Assume MNE A has a Canadian subsidiary that is representative of the corporations in our sample with a tax-to-asset ratio of 0.017. This ratio represents that average tax-to-asset ratio of the corporations in our sample that paid taxes. Since the average corporation in our sample has assets of approximately $1.3 billion, the corresponding federal tax liability is about $22.5 million.[20]

Consider the GMM specification. We can see in Table 5-12 that if our representative corporation is a Canadian manufacturing subsidiary and MNE A adds a subsidiary in Hong Kong, the tax-to-asset ratio of the Canadian corporation will fall by 29.0%[21] which corresponds to approximately a $6.5 million drop in the Canadian Part I tax liability. If the Canadian subsidiary is a non-manufacturing corporation, the total effect on the tax-to-asset ratio is a 35.6% drop ($8.031 million drop in tax liability). This change corresponds to about a 1.3% drop in the tax-to-asset ratio

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[19] In section 5-9 we provide possible explanations for the significant coefficients whose signs are contrary to the income shifting hypothesis.

[20] Note that this tax liability exceeds the average Part I tax liability in Table 4 because the figure in Table 4 includes all corporations, including those that did not pay taxes in some years.

[21] This effect is based on the average tax-rate differential over the sample period.

($0.291 million drop in tax liability) for every percentage point that the Canadian statutory tax rate exceeds the rate in Hong Kong.

Adding a subsidiary in Singapore has slightly smaller effects with the tax-to-asset ratio of a Canadian manufacturing corporation decreasing by 19.2% ($4.334 million drop in tax liability), and for a Canadian non-manufacturing corporation the response is a 30.9% decrease ($6.985 million decline in tax liability). While the effects are smaller than with a Hong Kong subsidiary, since the tax differential between Canada and Singapore is smaller, the effect of a 1% decrease in the tax differential results in a 2.3% decrease in the Canadian tax-to-asset ratio or about a $0.510 million drop in the Canadian Part I tax liability.

Since the coefficient for Japan is significantly positive and the tax differential is positive, it suggests that Japanese corporations are shifting income to Canada. The effect on Canadian manufacturing corporations of income shifting from Japan is an increase in the tax-to-asset ratio of nearly 48.2% ($10.888 million) while the effect for non-manufacturing corporations is only 28.8% ($6.499 million). This represents a 3.7% increase ($0.844 million) in the Canadian tax-to-asset ratio for every percent that the Japanese statutory tax rate exceeds the Canadian rate.

When there are subsidiaries in Belgium, a Canadian manufacturing corporation will increase its tax-to-asset ratio by almost 9.6% ($2.176 million increase) than if there is no subsidiary in Belgium as income is shifted to Canada. A Canadian non-manufacturing corporation will decrease its tax-to-asset ratio by over 18.2% ($4.110 million decrease) by shifting income to Belgium. Since the tax differentials are small, a one percentage point increase in the tax differential represents a 5.4% ($1.209 million) change in the Canadian tax-to-asset ratio.

The effect of adding a subsidiary in the United Kingdom is about 1.7% ($0.381 million) for every percentage point that the United Kingdom statutory tax rate is below the Canadian rate. This results in a 9.3% ($2.097 million) and a 18.1% ($4.080

million) drop in the Canadian tax-to-asset ratio if the MNE adds a subsidiary in the UK and the Canadian corporation is a manufacturing and non-manufacturing corporation respectively. The effects for the Netherlands are slightly larger than the effects for the United Kingdom while the effects for Ireland and France are slightly smaller.

The effects of having a subsidiary in Brazil, Germany, New Zealand, Spain, the United States and the tax havens are contrary to the income shifting hypothesis. Further, the magnitude of the effects are large for some countries.

Despite its status as a low-tax jurisdiction, adding a subsidiary in Spain actually increases the Canadian tax liability by 2.7% ($6.039 million) for a Canadian manufacturing corporation and 57.7% ($13.018 million) for a manufacturing corporation. The effects of adding a subsidiary in a tax haven are also large as the Canadian tax liability can be reduced by between 19.8% ($4.462 million) and 22.4% ($5.047 million) for manufacturing and non-manufacturing corporations respectively.

A negative coefficient for the United States suggest that when the Canadian tax rate is higher than the US tax rate income is shifted to Canada. The magnitude of the effects is also very large. If a subsidiary is added in the United States, the tax-to-asset ratio of a Canadian non-manufacturing subsidiary would *increase* by 67.5% ($15.236 million) or about 14.4% ($3.242 million) for every one percentage point difference in the tax rates. This result is contrary to the hypothesis of income shifting and suggests that something other than the tax rate differential is driving this result. We discuss a possible explanation for this result in section 5-9.

An interesting result from this analysis is that the effect of a 1% change in the tax differential results in different effects on the tax-to-asset ratio for different countries. For example, depending upon the location of the subsidiary, a one percent increase in the Canadian statutory tax rate would result in a decrease in the Canadian subsidiary's tax-to-asset ratio of between 0.3% ($0.058 million) and 5.4% ($1.209 million) for those jurisdictions where the estimated coefficient has the expected sign. When the estimated coefficient has the incorrect sign, the range from as low as a 0.5% ($0.113 million) change for Tax Havens to 14.4% ($3.242 million) for the United States.

5-7.2. Estimation results for the sub-samples

The diversity of the characteristics of the corporations in our sample allow us to estimate a variety of sub-samples. In particular, we compare private corporations and public corporations, corporations based on the parent's location, and manufacturing and non-manufacturing corporations. These results are summarised below.

Private versus public corporations

We estimate the model separately for private and public Canadian-based corporations.[22] The results of these estimations, along with the results of the estimation for the entire model are summarised in Table 5-13. Compared to the entire sample estimation, private corporations still have a significant coefficient that is consistent with the income shifting hypothesis for France, Hong, Kong, Japan, the Netherlands, Singapore, and the United Kingdom; the estimated coefficient remains significant and inconsistent with income shifting for Brazil, Germany, Spain, and the United States. For private corporations, the coefficients for Belgium, Ireland, and the tax havens are no longer significant, while there is now evidence of income shifting with Australia, Italy, and Switzerland. The coefficient for Mexico is also significant in the private corporations sub-sample, but the sign is inconsistent with income shifting. Finally, the control variables that were significant in the entire sample remain significant in the private corporation sub-sample and the signs of the estimated coefficients do not change.

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[22] Throughout the analysis, we refer to these corporations as only private or public although the term is intended to refer to MNEs that have a Canadian-based private or public subsidiary, or MNEs where the Canadian-based corporation is the parent corporations.

For public corporations, the coefficients for Germany, Hong Kong, Japan, Mexico, the United Kingdom, and the Tax Havens are significant and consistent with the income shifting hypothesis. However, the coefficients for Australia, Belgium, Ireland, and the United States are significant and the sign is insignificant with the income shifting hypothesis. Further, the coefficients on Brazil, France, the Netherlands, New Zealand, Singapore, and Spain are no longer significant. Finally, only rental expenses and the leverage factor are significantly negative in the public corporation sub-sample; CCA, salary expenses, SRED, and the loss carry-forward use are no longer significant.

The interesting result from these estimations is that the private corporations seem to be undertaking income shifting more so than public corporations. There are still some inconsistencies in the private corporation sub-sample, but these inconsistencies are not different from the inconsistencies found with the entire sample estimation. Further, there is even more support for the income shifting hypothesis in the private corporation sub-sample as Australia, Italy, and Switzerland now have significant positive coefficients, and the inconsistency with the tax haven coefficient has disappeared as the tax haven coefficient is no longer significant. Note, however, that the Belgium and Ireland coefficients are no longer significant. With the public corporation sub-sample, there are more inconsistent results and several coefficients that were significant in the entire sample are no longer significant (*e.g.*, France, the Netherlands, and Singapore).

Of perhaps more interest is the fact that the size of the income shifting coefficients for private corporations is noticeably larger when we compare the results to the coefficients in the entire sample regression. In fact, the coefficients for France, Japan, the Netherlands, Singapore, and the United Kingdom are between two and four times larger than the same coefficients for the entire sample. Therefore, some significant income shifting gains appear to be possible for private corporations.

Further investigation into the nature of the private and public corporation sub-samples suggests that our results are not surprising. Recall from Table 5-10 that private corporations are part of a MNE that has a far more extensive multinational structure than that found in public corporations Also, the private corporations all have foreign parent corporations. Perhaps this suggests that the more "traditional" MNEs (*i.e.*, those corporations that have fully-owned foreign subsidiaries) are more likely to engage in income shifting than the MNEs that have foreign corporations that are not wholly owned.

Therefore, it seems that private corporations are able to exploit the potential benefits from income shifting more than public corporations. This is not surprising given the fact the public corporations in our sample do not have the same degree of multinationality in their operations. With fewer subsidiaries over a narrower geographic distribution, it is not surprising that Canadian-based public corporations are not exploiting the potential gains from income shifting to the same degree as Canadian-based private corporations are.

Canadian parents versus US parents versus rest-of-the-world parents

The estimates for the sub-samples based on the location of the parent corporation yield some interesting results. We make the distinction between Canadian-based corporations with a Canadian parent, those with a US parent, and those with a parent in the rest of the world. Table 5-14 summarises the results.

The most notable results are those for Canadian-based corporations with a US parent (which represent only 25.5% of the corporations in our sample as noted in Table 5-2). These corporations provide the strongest support for income shifting in our sample. As with the estimation results for the entire sample, the coefficients for France, the Netherlands, and the United Kingdom are all significantly positive while the coefficients for Brazil, New Zealand, and the tax havens are significantly negative. But, the US parent sub-sample also has significantly positive coefficients for Australia, Italy, Mexico, and Switzerland. Unlike the entire sample estimation, the coefficients for Germany, Spain, and the United States have changed signs and now support the income shifting hypothesis. The coefficients for Belgium, Hong Kong, Ireland, and Singapore are significantly negative. These four coefficients are a concern because they are significantly positive for the entire sample. Although the coefficients for Mexico and the Netherlands are significantly positive, their magnitude is unrealistically large as adding a subsidiary in Mexico would reduce the Canadian tax liability by about 250%. One possible explanation is the fact that Mexico has an indexed tax system that makes it preferred to issue debt in Canada to finance Canadian investments in Mexico since only real interest can be deducted in Mexico.

Despite some problematic results for some coefficients, the US parent sub-sample appears to provide more support for the income shifting hypothesis than is found in the Canadian parent, the ROW parent sub-samples, and in the entire sample estimation. In addition, the magnitude of the coefficients in the US parent sub-sample is at least double the magnitude of the coefficients in the entire sample, and at times the US parent sub-sample coefficients are more than ten times larger. This result suggests that Canadian based corporations with a US parent are engaging in income shifting to a larger degree than other corporations.

The results for the Canadian parent and ROW parent sub-samples are mixed. Fewer coefficients are significant and the magnitudes of the significant coefficients are not as dramatically different from the entire sample estimation as we find in the US parent sub-sample results.

Manufacturing versus non-manufacturing corporations

In Table 5-15 we provide a summary of the estimation results on the manufacturing and non-manufacturing sub-samples. Unlike the other sub-samples, there does not appear to be evidence that manufacturing corporations are undertaking more or less income shifting than non-manufacturing corporations. However, in each estimation, there are some differences among the coefficients.

For manufacturing corporations, there is evidence of income shifting between the Canadian corporation and subsidiaries in Australia, Belgium, Germany, Singapore, Spain, and the United Kingdom. The tax haven coefficient is still significantly negative for manufacturing corporations, and the Hong Kong and Ireland coefficients have switched sign compared to the entire sample and are significantly negative. The significant coefficients are larger than in the entire sample estimation.

Interestingly, the coefficient for the United States is not significant in the manufacturing sub-sample. This is not necessarily surprising. Canadian corporations that undertake manufacturing and processing activities receive preferential tax treatment and pay a rate that in 1994—the last year in our sample—was 7% lower than the rate paid by non-manufacturing corporations. As a result, the Canadian manufacturing tax rate during our sample period was lower than the rate in the United States, although the difference was minimal. The small tax differential greatly reduces the incentives to actively shift income between the two countries.

For non-manufacturing corporations, there is also evidence of income shifting. As with the manufacturing corporations, there is evidence that non-manufacturing corporations are shifting income between Canada and Australia and Singapore. Additionally, as with the entire sample estimation, there is evidence of income shifting with Hong Kong and Japan. Unlike the entire sample estimation and the manufacturing sub-sample, the coefficient for Switzerland is significantly positive. The coefficient for the United States is significantly negative and is consistent with the findings for the entire sample estimation, as are the coefficients with Spain and Brazil. Finally, the coefficient for the United Kingdom is now significantly negative in the non-manufacturing sub-sample.

5-8. Alternative model specification

5-8.1. Empirical specification

Hines and Rice (1990) note that the complexity of tax codes makes it difficult to obtain a good representative measure of the tax rate facing a corporation in various jurisdiction. Provisions for deductions, depreciation rules, and loss carry-overs will vary across countries. There can also be industry-specific tax holiday provisions. Therefore, it is difficult to devise a manageable empirical framework that takes into account the *actual* tax rate faced by a MNE in various jurisdictions. We have made every effort in the tax-differential specification to determine an accurate representative statutory tax rate, but we are unable to overcome all the concerns raised by Hines and Rice (1990).

As an alternative approach, we drop the tax differential from the model and focus solely on the presence of a MNE in a particular jurisdiction. To further simplify our analysis, we group countries into high-tax and low-tax categories based on geographic location and tax characteristics. The details of this grouping are provided in Table 5-16 and Table 5-17.

The use of dummy variables based solely on a presence in a high-tax or a low-tax jurisdiction can be problematic if the amount of income shifting that a MNE undertakes between two jurisdictions depends upon the size of the operations in each jurisdiction. While it would be interesting to account for the size of the operations of subsidiaries, the lack of data prevents us from doing so and limits us to a specification based solely on a presence in a jurisdiction. To some extent, we may be able to overcome the issue of the size of the foreign operations since our sample includes only large Canadian-based corporations. It is not unreasonable to expect that, given the multinational structure of the corporations in our sample, the operations in other jurisdictions are sufficiently large that size will not be as critical.[23]

Assuming the locational decision is exogenous and independent of income shifting decisions, we use location dummy variables as independent variables in our estimating equation:

$$\left(\frac{T^C}{A^C}\right)_{ft} = \alpha^H \mathbf{d}_{ft}^H + \alpha^L \mathbf{d}_{ft}^L + \beta \mathbf{C}_{ft} + \varepsilon_{ft} \qquad (5.5)$$

where T^C is the Canadian tax liability, A^C is total book value of Canadian assets, f and t are firm and time subscripts; $\mathbf{d}_{ft}^H$ and $\mathbf{d}_{ft}^L$ are vectors of dummy variables for firm f in period t where H and L indicate the foreign subsidiary is in a high-tax or low-tax jurisdiction respectively; **C** is a vector of control variables such as industry classification, and expenses such as interest costs; α^H, α^L, and β are vectors of regression coefficients and ε_{ft} is a well-behaved error term. All financial data are scaled by A^C.

The hypothesis of income shifting involves testing if the components of α^H are positive while the components of α^L are negative. These tests presume that having a subsidiary in a high-tax country induces the MNE to shift income to Canada, increasing taxable income and the Canadian tax liability. Operating in a low-tax country induces a shift of income in the opposite direction and will lower the Canadian tax liability.

5-8.2. Determination of high-tax and low-tax jurisdictions

We categorise a country as a high-tax jurisdiction if we find its statutory rate exceeded the Canadian statutory tax rate, taking into consideration whether the Canadian-based corporation pays the manufacturing or the non-manufacturing rate.

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[23] This problem is also present in our tax-differential specification and has no obvious solution.

This is done for every year in the sample. It is important to make this determination for every year in the sample because, during this time period, many tax rates are changing and it is not uncommon for a country to be a high-tax jurisdiction for one part of the sample period and a low-tax jurisdiction for the other part.[24]

As with the tax differential specification, we are unable to estimate the model with a dummy variable for each high-tax and low-tax jurisdiction. Therefore, we group countries that have similar geographic and tax characteristics to allow for a more feasible estimation. This also eliminates the importance of the exact locational decision because now, for our analysis, there is no difference between locating in the United Kingdom or France since they are both in low-tax Western Europe. This approach helps ensure the locational decision is exogenous. It also helps control for differences in the cost of shifting income because corporations within the same region will likely experience similar costs.

We divide the world into several geographic regions: the United States; Central America; South America; Western Europe; Eastern Europe; the Middle East; Africa; Asia and the South Pacific; and Australia and New Zealand. We then divided each geographic region into high-tax and low-tax jurisdictions. Therefore, we do not distinguish between income shifting that occurs from the United Kingdom and France. Rather, both are low-tax jurisdictions relative to Canada so we include them in the low-tax Western Europe group and focus on income shifting that occurs from subsidiaries within that group.

There are a few notable exceptions to our groupings. First, we group all tax havens together, regardless of geographic location. Since tax havens are used for non-production purposes, their geographic location is not important. Second, Ireland is a uniquely low-tax jurisdiction due to significant tax holidays which reduce the tax rate to 10%. However, it has its own category because the tax advantages in Ireland are quite different from the typical tax haven. Most notably, manufacturing and financial services income are eligible for the tax holiday which reduces the tax rate to 10% during the entire sample period. The typical tax haven would not be a location for manufacturing activities; rather, the typical tax haven is used solely for financial purposes.

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[24] We note that Harris *et al.* (1993) appear to use only one tax year to determine if a country is a high-tax or a low-tax jurisdiction.

Third, Japan is in its own category, separate from high-tax Asia and the South Pacific. Forty percent of the MNEs have a presence in Japan. Fourth, we assign Hong Kong, South Korea, Singapore, and Taiwan the category "Four Dragons" as they have a similar business climate and tax holidays in South Korea, Singapore, and Taiwan result in the statutory tax rates overstating the true tax burdens. Fifth, we place South Africa in its own category because of political and capital control issues that are present during our sample period.

Finally, there are some countries for which it is not possible to easily ascertain the applicable statutory tax rate, particularly when a country has a relatively small economy and is not a common country of choice for the location of a MNE's subsidiary. We simply excluded subsidiaries in these jurisdictions from our analysis. While it would be preferable to determine the applicable tax rate in each year of the sample for these select countries, there are very few corporations in our sample that have a subsidiaries in these countries and, if a MNE has a subsidiary in one of these countries, it typically has another subsidiary in the region, and often has a subsidiary in both high-tax and low-tax countries in the region.

Each of the locational dummy variables is given a value of one if the MNE has a subsidiary in the category and zero otherwise. Therefore, if a MNE has a subsidiary in the United Kingdom and France, both in low-tax Western Europe, the dummy variable takes on a value of one; the dummy variable is not equal to the number of subsidiaries in the category.

5-8.3. *Descriptive statistics*

Table 5-18 provides an indication as to where in the world the foreign subsidiaries of the multinational associated with our Canadian-based corporation are located. The average statutory tax rates also are included for each high-tax and low-tax region. By far the most popular subsidiary locations is the United States with 95% of the corporations having a subsidiary there (77% of the MNEs consider the United States to be a low-tax jurisdiction and 18% consider the United States to be a high-tax jurisdiction). Low-tax Western Europe is the next most popular region with 81% of the MNE's having subsidiaries in countries in this region; tax havens are the third most popular region with a 62% presence. In the low-tax regions, 58% have a subsidiary in Australia or New Zealand, and almost half have subsidiaries in South America (48%) and the Four Dragons (47%). In high-tax regions, the most popular location for a subsidiary is Western Europe and Japan at 60% and 40% respectively.

There are some interesting differences when we compare the degree of multinationality among private and public corporations as well as MNEs with parent corporations in Canada, the United States and the rest of the world. The figures in Table 5-19 suggest that Canadian private corporations that are part of a MNE have much more extensive multinational operations than the Canadian public corporations in our sample. The public Canadian corporations that are part of a MNE generally have a subsidiary in the United States, low-tax Western Europe, and a tax haven; only 25% have a subsidiary in the Four Dragons and even fewer have subsidiaries in other regions. For the private Canadian corporations, over half of the MNEs have subsidiaries in the United States, and many low-tax regions including Central America, South America, Western Europe, the Four Dragons, Asia and the South Pacific, Australia and New Zealand, along with high-tax regions such as Western Europe and Japan; almost three-quarters have a subsidiary in a tax haven. Therefore, we can see the structure of the MNEs associated with our Canadian corporations is much more multinational when the Canadian corporation is privately owned. It is also interesting to note that the degree of multinationality is more extensive when the parent corporation is located outside Canada. While some Canadian MNEs have a substantial global corporate structure, the MNEs based in the United States and other countries have a far more extensive structure. Interestingly, there is not much of a difference between the multinational structure of manufacturing versus non-manufacturing corporations.

Finally, in Table 5-20, we can see that the average tax-to-asset ratios for the Canadian corporations in our sample are lower in almost every case when there are subsidiaries in low-tax jurisdictions compared to when there are subsidiaries in high-tax jurisdictions. Further the lowest tax-to-asset ratios are generally found in the regions where tax rates are the lowest: tax havens, Ireland, and the Four Dragons. However the average tax-to-asset ratio in the high-tax jurisdictions and low-tax jurisdictions are similar (0.01042 versus 0.00982).

5-8.4. Estimation results from the pooled sample

The same estimation techniques are used for the high-tax/low-tax estimation as are used for the tax differential specification. In addition, the variables in the **C** vector are identical; all that has changed is the tax differential is excluded and the locational dummy variables are now regional dummy variables with a distinction made between high-tax and low-tax jurisdictions. The estimation results for the OLS and the GMM specifications for the entire sample are included in Table 5-21.

As with the tax differential estimation, while we only report results from one OLS and one GMM specification, we did try alternative approaches. We looked at a simple OLS specification, a fixed-effects model, and a random-effects model. However, even after the financial data were scaled by total assets, tests suggested that there was a heteroskedasticity problem. This suggested we should use an OLS cross-sectionally heteroskedastic time-wise autoregressive specification. The possibility that some right-hand-side variables may be endogenous led us to use the GMM specifications.

Recall that a negative coefficient for the low-tax regions and a positive coefficient for the high-tax regions supports the income shifting hypothesis. For the GMM specifications there is evidence of income shifting. The coefficients for low-tax Africa, the Four Dragons, and low-tax Asia and the South Pacific are all significantly negative and the coefficients for high-tax Central America, high-tax Asia and the South Pacific, and the high-tax Middle East are significantly positive. The tax haven coefficient is also significantly negative.

There are a few coefficients whose sign is incorrect. In particular, the high-tax United States coefficient is significantly negative as is the high-tax Africa coefficient. Ireland, a low-tax jurisdiction with some tax haven properties is significantly positive and the South Africa coefficient is significantly negative.

The wrong sign on the high-tax Africa coefficient is not a concern as only 7% of the corporations have subsidiaries in this region. Recall that only Canadian manufacturing corporations view the United States as a high-tax jurisdiction. Only 18% of the corporations in our sample have subsidiaries in the high-tax United States region. Thus, the wrong sign on this coefficient will be a more significant concern if there were more corporations in our sample that viewed the United States as a high-tax region.

In the GMM specifications, the CCA, interest expenses, rental expenses, SRED, investment tax credits, and loss carry-forward use are all significantly negative, but the leverage factor is not significant.

5-8.5. *Magnitude of income shifting*

Next, we focus on the magnitude of income shifting that may be present. As with the tax differential estimation, we consider the effects of an existing MNE adding a subsidiary in a region, but the regional specification does not permit us to examine the effect of a change in the tax differential. Assume MNE A has a Canadian subsidiary that is representative of the corporations in our sample with a tax-to-asset ratio of 0.017. This ratio represents that average tax-to-asset ratio of the corporations in our sample that paid taxes. Since the average corporation in our sample has assets of approximately $1.3 billion, the federal tax liability is about $22.5 million.

Consider the GMM specification. We can see in Table 5-22 that if our representative corporation is a Canadian manufacturing subsidiary and MNE A adds a subsidiary in low-tax Africa, the Canadian tax liability can be reduced by 29% or $6.548 million. Adding a subsidiary in Asia and the South Pacific or one of the Four Dragon countries reduces the Canadian tax liability by 49.8% ($11.249 million) and 42.6% ($9.615 million) respectively. Finally, if a subsidiary is added in a tax haven, the Canadian tax liability decreases by 25.7% or $5.804 million. These results suggest that a substantial amount of income can be shifted to some low-tax jurisdictions.

If a subsidiary is added in high-tax Central America, then income is shifted to Canada, raising the Canadian subsidiary's tax liability by almost 55% or $12.351 million. The results for adding a subsidiary in high-tax Asia and the South Pacific and the high-tax Middle East are also substantial with increases in the Canadian tax liability equalling 26.4% ($5.963 million) and 45.4% ($10.253 million) respectively.

Some coefficients have signs that are inconsistent with the income shifting hypothesis. Further, in Table 5-22 we can see that the change in the Canadian tax liability when a subsidiary is added in these jurisdictions can be substantial. For example, the coefficient for the high-tax United States is significantly negative and adding a subsidiary in this jurisdiction would reduce the Canadian tax liability by 43.5% or $9.815 million. Recall from the previous section that only Canadian manufacturing corporations view the United States as a high-tax jurisdiction and only a small portion of corporations have a subsidiary in this jurisdiction. The same argument holds for high-tax Africa where the coefficient suggests that income is shifted from Canada to high-tax Africa, reducing the Canadian tax liability by as much as 45% or $10.080 million.

5-8.6. Estimation of the sub-samples

The diversity of the characteristics of the corporations in our sample allow us to estimate a variety of sub-samples. As with the tax differential specification, we compare private corporations and public corporations, corporations based on the parent's location, and manufacturing and non-manufacturing corporations. These results are summarised below.

Private versus public corporations

We estimate the model separately for private and public Canadian-based corporations. The results of these estimations, along with the results of the estimation for the entire model are summarised in Table 5-23. The estimation results for the private corporations suggest there is considerable support for income shifting. In fact, more coefficients are significant in this sub-sample.

For the low-tax jurisdictions, there is support for the income shifting hypothesis when there are subsidiaries in the United States, Central America, Eastern Europe, the Four Dragons, and Asia and the South Pacific; the tax haven coefficient is also significantly negative. The other four regions (South America, Western Europe, Africa, and the Middle East) have significant coefficients with the incorrect sign. In the high-tax jurisdictions, all coefficients are significant. There is support for income being shifted to Canada from subsidiaries located in South America, Africa, Western Europe, Eastern Europe, Asia and the South Pacific, and the Middle East; the coefficients for the United States, Central America, and Japan are significant with the unexpected sign.

For public corporations, there is support for income shifting, but there are fewer significant coefficients compared to the private corporations sub-sample, and more coefficients have the incorrect sign (although several are insignificant). There is support for income shifting from Canadian subsidiaries to subsidiaries located in low-tax Africa, low-tax Western Europe, and the Four Dragons. The coefficient for low-tax United States, low-tax South America, low-tax Eastern Europe, and low-tax Asia and the South Pacific are significant with the wrong sign. We provide a possible explanation of some of these results in section 5-9.

For the high-tax regions in the public corporations sub-sample, only high-tax South America and high-tax Asia and the South Pacific have significantly positive coefficients; the high-tax United States, high-tax Central America, high-tax Africa, and Japan have significant coefficients with the unexpected sign.

The tax haven coefficient is also significantly positive and support the income shifting hypothesis. Unlike the entire sample estimation and the private corporation sub-sample estimation, there is support for income shifting to Ireland as the coefficient is significantly negative for the public corporation sub-sample. One concern with the public corporation sub-sample is the fact that fewer control variables are significant and the signs on the rental expense and investment tax credit coefficients are positive instead of negative; the leverage factor is also not significant in the public corporation sub-sample.

The results from the private and public corporation sub-samples suggests that the private corporations are more effectively shifting income between high-tax and low-tax jurisdictions to take advantage of international tax differentials.

Canadian parents versus US parents versus rest-of-the-world parents

The estimates for the sub-samples based on the location of the parent corporation do not seem to yield much new information. We make the distinction between

Canadian-based corporations with a Canadian parent, those with a US parent, and those with a parent in the rest of the world. Table 5-24 summarises the results.

The corporations with a Canadian parent have the most significant coefficients, but a majority of the coefficients have the wrong sign. When we examine the US parent sub-sample and the ROW parent sub-sample, there is some support for the income shifting hypothesis. Perhaps most interesting is the fact that these two sub-samples have different significant coefficients. For example, in the US parent sub-sample, the low-tax Western Europe, low-tax Eastern Europe, and Four Dragon coefficients are significantly negative, while none of these are significant for the ROW sub-sample. Conversely, the low-tax Asia and the South Pacific coefficient and the high-tax Africa, and high-tax Asia and the South Pacific coefficients are significant with the expected sign for the ROW sub-sample and they are not significant in the US parent sub-sample.

Manufacturing versus non-manufacturing corporations

In Table 5-25 we provide a summary of the estimation results on the manufacturing and non-manufacturing sub-samples. The interesting result from this sub-sample estimation is that the manufacturing sub-sample has no explanatory power. The non-manufacturing corporation sub-sample supports income shifting from the Canadian corporation to subsidiaries in low-tax United States, low-tax Africa, the Four Dragons, and low-tax Asia and the South Pacific.

For the high-tax jurisdictions, the coefficients for Western Europe, Japan, Asia and the South Pacific, and the Middle East are all significantly positive; only high-tax South America is significant with the wrong sign. While there are some differences between the non-manufacturing sub-sample and the entire sample estimation, most of the coefficients that are significant in the entire sample are significant in the non-manufacturing sub-sample.

5-9. Possible explanations for coefficients with inconsistent sign

Countries with relatively high political, inflation, and exchange-rate risks tend to have lower corporate tax rates. We find that for a few jurisdictions, notably Brazil in the tax differential specification, the signs are unexpectedly significantly negative. In these countries, corporations may wish to shift income (and also repatriate income through dividends) every year in order to avoid any potential losses associated with exchange-rate risks and also the risk that the income will decline in real terms due to high levels of inflation. There may also be some political risks or capital controls that corporations wish to avoid. Therefore, income may be shifted to Canada regardless of the tax differential, resulting in a negative coefficient for these low-tax jurisdictions.

Glenday and Mintz (1990) note that an increasing proportion of Canadian corporations were in a surplus tax loss position during the early 1980s. A MNE may find it advantageous to shift income from a low-tax jurisdiction to the Canadian subsidiary because the marginal tax rate on this income is actually less than the tax rate in the low-tax jurisdiction due to the surplus tax loss. While the global tax liability will be further reduced by shifting more income from a high-tax jurisdiction to the Canadian subsidiary to offset the surplus tax losses, it may not be feasible to do so. Shifting more income from the high-tax jurisdiction may become too costly and it may raise suspicion with the tax authorities that abusive transfer pricing is being employed. Further, there may not be sufficient income available to shift from the high-tax jurisdiction (*e.g.*, low or negative taxable income). Shifting income from a low-tax jurisdiction to Canada to offset a surplus tax loss may be relatively easy and may not appear suspicious to tax authorities. We have attempted to control for this possibility by including the use of tax losses as a control variable.

Another explanation for the inconsistent sign, as proposed by Harris *et al.* (1993), is that our results might be capturing some economies of scale embedded in multinationals. As Caves (1986) notes, the internationalisation theory suggests that having a subsidiary in any large foreign market can lead to higher returns on certain intangible goods. Intangible assets may represent technology that allows a corporation to produce a cheaper or better product at a given input price, or produce a product at a lower cost than competing firms. The intangible asset may be a patent or simply the know-how of employees. Marketing ability and effective and dedicated management are other examples. As Caves (1982) notes, these intangible assets yield a rent to the firm and make the firm appear more successful.

The presence of a MNE in any tax jurisdiction may in fact increase its profitability, thus increasing its tax liability. Take, for instance, a Canadian-based corporation that is part of a MNE that has a subsidiary in the United States. The fact the Canadian subsidiary has access to the US market may allow the Canadian subsidiary to exploit economies of scale or internalise the benefits of an intangible good, thus significantly increasing the Canadian corporation's profits and corresponding tax liability. While the tax rate in the United States is lower and there can be benefits from shifting income to the United States, the access to the US market may overshadow the size of income shifting that may be present.

We have attempted to control for the existence of intangible assets by introducing control variables such as research and development expenditures and salary expenditures which are intended to proxy for production- and employee/management-related intangibles. If our control variables are unable to fully capture the effect of these intangibles, the locational dummy variable would be affected. As Harris *et al.* (1993) notes, a negative coefficient for a low-tax jurisdiction may not imply income is shifted in the wrong direction. Instead, it may imply that while income is shifted to the low-tax jurisdiction, access to this low-tax jurisdiction may result in increased profitability due to the size and nature of the market. Thus, the tax-to-asset ratio can be higher.

Our estimation has not taken into account the existence of tariffs. It is difficult to incorporate tariffs into the model since we do not know the tangible goods that are bought and sold by foreign subsidiaries and we do not know the specific tariff rates on the tangible goods. If the corporations in our sample are undertaking some level of transactions with goods subject to tariffs, the tax liability of the income shifted through the transaction is higher than the tax rate that we have used in out analysis. The presence of tariffs can be very important when statutory tax differentials are very small. Trade between Canada and the United States is very large and a large portion of the trade is intra-firm trade. Therefore, tariffs, although small, will reduce the tax differential between Canada and the United States and can influence the income shifting.

Another possible explanation for the inconsistent signs in our estimations may relate to the fact that tax rates do not remain constant over time. For a MNE to take full advantage of income shifting opportunities, the world-wide operations must be set up in a manner that utilises tax incentives. For example, suppose a US manufacturing corporation sets up operations in a lower tax jurisdiction and structures transactions in such a way that income is shifted from the US to the low-tax jurisdiction. If the tax rate in the foreign jurisdiction increases and now exceeds the US tax rate, the income flows are travelling in the wrong direction as income flows from the low-tax jurisdiction (now the US) to the high-tax jurisdiction (now the foreign jurisdiction). A quick restructuring of the transaction is likely difficult.

As we note in Appendix 3, for manufacturers, the US tax rate was higher than the Canadian tax rate in the early 1980s. In 1987, the US tax rate was below the Canadian tax rate, and in 1988 the US rate was still lower, but the differential was below 2% and was narrowing. With a small tax differential, the benefits of restructuring the MNE to take advantage of the income shifting potential related to the tax differential may not exceed the costs of the restructuring. Therefore, the transactions may flow in a direction that is inconsistent with income shifting. Further, even if the benefits of income shifting exceed the cost of restructuring, the restructuring cannot happen immediately. Therefore, it is possible for the coefficient in our model to have the unexpected sign.

Finally, we note that our result with respect to some incorrect signs is not completely unexpected. As noted in Appendix 3, there is evidence that income shifting between Canada and the United States is not in the expected direction. But, there is evidence that MNEs time payments to take advantage of the tax differential. Further, Harris *et al.* (1993) find some evidence that the income shifting between Canada and the United States, for example, is not as expected, thus confirming our results.

5-10. Comparison of tax differential and locational dummy variable specifications

Table 5-26 and Table 5-27 provide summaries of the results for the tax differential specification and the locational dummy variable specification. The tables indicate if the coefficient is consistent or inconsistent with our expectations. For the tax differential case, we find that eleven countries are generally consistent with our expectations. When significant, coefficients for France, Italy, Japan, and Switzerland are consistent with our expectations. For Australia and New Zealand, Belgium, Hong Kong, Netherlands, Singapore, and United Kingdom, the coefficients are generally consistent, with a majority of the coefficients having the expected sign. Brazil always has an inconsistent sign and Mexico has an inconsistent sign half of the time. However, as noted in section 5-9, political and exchange rate risks provide possible explanations for the inconsistencies. Therefore, we consider the results for these two countries to be acceptable.

In the locational dummy variable case, the coefficients for low-tax Africa, Western Europe, the Four Dragons, Asia and the South Pacific and high-tax South

America, Eastern Europe, Asia and the South Pacific, Eastern Europe, the Middle East, and the Tax Havens all have at least a majority of the coefficients consistent with our expectations. Other coefficients, including low-tax Central America, low-tax South America, high-tax Central America, and South America all have coefficients that could be explained by political and exchange rate risks. Therefore, we consider these coefficients to be acceptable.

When we compare the results of the two specifications, there seems to be little difference. Countries that have consistent coefficients in the tax differential specification generally are consistent in the locational dummy variable specification. For example, France is consistent in the tax differential case and is also consistent in the locational dummy variable case since the coefficient for low-tax Western Europe is consistent with our expectations. In fact, there is little difference between the two specifications for nine countries as the coefficient for the locational dummy variable associated with the country is also consistent. For two countries (Australia/New Zealand, and Japan), the tax differential specification is consistent while the corresponding locational dummy variable is not consistent and for two other countries (Spain and Belgium), the corresponding locational dummy variable specification seems to provide more consistent results.

We do not feel that either specification is absolutely preferred as each specification has some benefits and disadvantages. Instead, we view the two specifications as complementary to each other, both providing support for the income shifting hypothesis.

5-11. Model improvements

We have made some simplifications in the model due to data limitations. For example, we use the statutory tax differential (combined central government and state government rate) since we do not know the actual tax rate paid by the foreign subsidiaries. In the ideal world, there are some modifications to our model that we would incorporate.

First, we do not know the size of the foreign operations of the MNEs. If two MNEs have operations in the United Kingdom, we assume that the income shifting potential is identical for the two MNEs even though one MNE may have a subsidiary with $1 million in assets and the other MNE may have a subsidiary with $100 million in assets. Clearly, the income shifting potential for the two MNEs is not the same. Further, we do not know the profitability of the foreign operations. Again, two MNEs may have similar sized foreign subsidiaries but the profitability of these subsidiaries may be dramatically different; this affects the income shifting abilities of the MNE. It would also be useful to know the volume of cross-border charges between entities of the MNEs to determine the true extent of the income shifting potential. Therefore, financial information on the foreign subsidiaries would be very useful.

In addition to the size of the foreign operations, the global consolidated financials for the MNE can help distinguish between the income shifting potential of two MNEs as a MNE that is larger on a global scale may have more income shifting potential. Since many of the MNEs in our sample are privately owned, this data is not easily accessible.

Second, we assume that the coefficient on the tax differential and the locational dummy variables is constant across companies and across time. It is not unreasonable to expect that the coefficient can change if there are significant changes to corporate income tax differentials over time.

Third, our data set only includes large Canadian-based corporations that have a multinational presence. As a result, when we examine the magnitude of adding a subsidiary in a foreign jurisdiction, we must examine how this change affects the average MNE in sample. It would be useful if our data included Canadian-based corporations that have no multinational presence. In this case, we could examine the impact of a corporation becoming multinational by adding a subsidiary in various foreign jurisdictions. Unfortunately, data for large Canadian corporations that are not multinational in nature was not included in our data set. Further, it may be difficult to find these corporations since most large Canadian corporations will already have some degree of multinational operations.

Finally, it can be useful to try to incorporate tariffs in the model along with dividend repatriation to capture the full behaviour of the MNE. On the dividend front, there is limited available data and access to internal financial documents will be important. For tariffs, it is necessary to know the volume of transactions that are subject to tariffs.

5-12. Conclusions

Utilising a unique corporate taxation panel data set, we estimate a model that indirectly tests for the presence of income shifting by considering if the location of subsidiaries and international tax differentials can explain the tax-to-asset ratio of the corporations in our sample. Our results suggest that, to some degree, Canadian-based corporations that are part of a MNE engage in tax-motivated income shifting. In particular, there is evidence that MNEs are shifting income from the Canadian-based corporation in our sample to subsidiaries in Hong Kong, Singapore, the United Kingdom, Belgium, and Ireland (low-tax jurisdictions), thus reducing the Canadian tax-to-asset ratio and reducing the MNE's global tax liability. We also find some evidence that income is shifted from Japanese subsidiaries to the Canadian corporations in our sample. This result also is consistent with the income shifting hypothesis.

This income shifting can alter the Canadian tax liability of a representative corporation by several million dollars. The magnitude of the effect depends upon the tax differential. The effect of a one percentage point change in the tax differential is not constant across countries. In fact, a one percentage point change in the tax differential can result in a change in the Canadian tax liability for a representative corporation of between $0.113 million and $2.280 million, depending upon where the subsidiaries are located.

We also estimate the model for several subsamples. Most notably, we find that Canadian-based corporations with a US parent (which represent only 25.5% of the corporations in our sample), provide the strongest support for income shifting in our sample. We also find strong evidence for income shifting with private Canadian corporations, all of which have foreign ownership.

Using an alternative specification that only takes into account the presence of a subsidiary in a high-tax or low-tax region, we find further support for income shifting. In particular, there is evidence that income is shifted from Canadian corporations to foreign subsidiaries in Africa, Asia and the South Pacific, and the tax havens while income is shifted to Canada from subsidiaries in high-tax Central America, high-tax Africa, high-tax Asia and the South Pacific, and the high-tax Middle East. As with the tax differential specification, the size of the income shifting can be substantial (a reduction of up to 50% of the Canadian tax liability).

Having a subsidiary in some jurisdictions causes income to be shifted in an unexpected direction. We suggest two possible explanations. First, when a subsidiary is located in a jurisdiction where political risk, exchange-rate risk, or capital controls may be present, there is evidence income is shifted to the Canadian-based corporation. This suggests the MNE is trying to get income from an unstable jurisdiction to a relatively more stable jurisdiction, regardless of the tax rate differential. The internationalisation theory is the second possible explanation, suggesting that access to larger markets and the internalisation of the benefits from intangible assets can result in economies of scale that cause the corporation to be more profitable and the tax-to-asset ratio to be higher. The presence of surplus tax losses, a third possible explanation, does not appear to be affected by the location of the foreign subsidiaries, although these surpluses will affect the tax-to-asset ratio of the Canadian-based corporations. Fourth, the responsiveness of MNEs to tax changes may not be immediate, thus affecting the coefficients estimated in our specifications. Finally, we have ignored the presence of tariffs. Depending upon the types of transactions being undertaken by the corporations in our sample, tariffs may have some effect and they may provide some explanation for our incorrect coefficients.

In the past few years, the CCRA has devoted more resources to the issue of income shifting and transfer pricing. In particular, corporations are encouraged to enter into advanced pricing agreements whereby the corporation provide the CCRA with an explanation of how a transfer price will be determined and the CCRA can confirm if the pricing method is acceptable. This reduces the need for the CCRA to audit for abusive transfer pricing activities, and it provides greater certainty for the corporation knowing that they will not be hit with penalties and a re-evaluation of their tax liability because they used an inappropriate transfer pricing methodology.

Our results suggest that the actions of the CCRA are warranted because there is evidence that income shifting was occurring between 1987 and 1994 and the effect on tax liabilities can be substantial. It will be interesting to undertake similar research in the future with new observations for the post-1994 period to see if the CCRA's focus on transfer pricing and income shifting has been effective.

The sub-sample analysis suggests that Canadian-based private corporations that are part of a MNE are more likely to shift income to low-tax jurisdictions and the amount of income shifted by these corporations is significantly more than the income shifted by Canadian-based public corporations that are part of a MNE. There is also support for more income shifting being undertaken by Canadian-based corporations that have a parent corporation located in the United States. One possible reason for this result is the fact that Canadian-based corporations with a US parent tend to have be more multinational than Canadian-based corporations with a Canadian parent. Therefore, the CCRA could most effectively utilise its transfer pricing audit resources if it focused audits on privately-owned Canadian-based corporations that are subsidiaries of a US-based MNE since these corporations seem to be undertaking more income shifting.

Even if the CCRA's focus on transfer pricing audits ensured that all international intra-firm transactions are priced at an arm's length, an MNE can still shift income from high-tax to low-tax jurisdictions by strategically structuring the operations of the MNE in a manner that ensured that more income is reported in low-tax jurisdiction and more expenses are claimed in high-tax jurisdictions.

Our results have implications for tax policy as it pertains to the level of corporate taxation in Canada. We have shown that Canadian-based corporations that are part of a MNE are, to some extent, shifting income away from Canada to low-tax jurisdictions and that depending upon the location of the foreign subsidiary, the magnitude of the shifting can be large. It is often assumed that lower tax rates result in lower tax revenues. Our results suggest that lower Canadian corporate tax rates would reduce the degree of income shifting, thus increasing the Canadian tax base and increase the tax revenues the government can collect from MNEs.

While lower tax rates will result in more tax revenues from MNEs located in Canada, the revenue from non-MNEs located in Canada will decline because these corporations are unable to shift income out of Canada to avoid Canadian taxation. Further research needs to be done in this area to determine if the revenue gained from the larger tax base on MNEs will offset the lower tax revenue collected from the unchanged tax base of Canadian corporations that are not part of a MNE.

5-13. References

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Table 5-1 Summary of empirical studies on transfer pricing

Study	Data	Question	Results
Aggregate data			
Grubert and Mutti (1991)	Cross-country aggregate data on the affiliates of US manufacturing MNEs. Source: US Department of Commerce 1982 Benchmark Survey	Do MNEs shift profits from high-tax to low-tax countries through transfer pricing?	Empirical support for transfer pricing.
Hines and Rice (1990)	Cross-country aggregate data on US non-bank majority-owned affiliates of US MNEs. Source: US Department of Commerce 1982 Benchmark Survey.	Are US MNEs that have foreign subsidiaries in tax havens engaging in transfer pricing?	Empirical support for transfer pricing.
Firm-level data			
Grubert, Goodspeed, and Swenson (1993)	Firm-level panel data on corporations reporting assets of at least $50 million. Source: US Internal Revenue Service Statistics of Income Division. Data covers 1980-1987. Cross-section for 1987 includes 600 controlled-foreign corporations and 4,000 domestically-controlled corporations. Panel data includes 110 CFC and 1,300 domestically-controlled corporations.	Indirectly examine transfer pricing by studying the distribution of the ratio of taxable income to assets, hypothesising that taxable income should be concentrated around zero on the basis that large profits would be shifted to lower-tax countries while large losses would be shifted to higher-tax countries. This would suggest that MNEs were tax planning through transfer pricing.	Empirical support for transfer pricing but other factors explain about one-half of the difference in the rate of return.
Harris, Morck, Slemrod, and Yeung (1993)	Firm-level data on US manufacturing firms. Source: Compustat. Data covers 1984-1988.	Are taxes paid by US MNEs related to the location of foreign operations?	Empirical support for income shifting through transfer pricing.

Source: Authors summary.

Table 5-2 Non-financial corporation characteristics

	Percentage of Corporations
Ownership Structure	
Private	47.9%
Public	36.2%
Other[1]	16.0%
Parent Corporation Location	
Canada	42.6%
United States	25.5%
Rest of the world	28.7%
Other[2]	3.2%
Type of corporation	
Manufacturing corporations	37.2%
Non-manufacturing corporations	62.8%

Source: *Author's calculations based on Revenue Canada Corporation Sample File.*

1. This category includes those corporations not considered either private or public. Prior to 1989, private corporations controlled by a public corporation was classified in this category. If the corporation's status changed during the sample period and therefore could not be classified as either always public or always private, we reclassified it as other.
2. This category includes those corporations whereby the location of the parent corporation changed during the sample period.

Table 5-3 Industry classification

Industry	Percentage of Corporations
Natural Resources	16%
Heavy Industry and Machinery	20%
Clothing	7%
Transportation	4%
Financial companies	11%
Construction	7%
Wholesale trade	24%
Services	2%
Other[1]	9%

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. We have classified corporations into major industry groups based on their primary SIC code. The "other" industry includes corporations whose major industry grouping did not contain a sufficient number of corporations to ensure confidentiality.

Table 5-4 Financial statistics for entire sample

Financial Variables	Average ($ millions)
Total assets	$1,328.1
Total revenue	$833.6
Interest expenses	$54.5
Depreciation expenses	$90.2
Rental expenses	$2.6
Salary expenses	$105.3
Scientific research and experimental development	$6.2
Taxable income	$26.9
Investment tax credits	$1.1
Part I tax liability	$6.2
Total debt	$530.6
Average federal Part I tax liability[1]	23%
Average interest rate	10%
Average investment tax credit rate (maximum = 20%)	17%

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. The average statutory federal tax rate less the provincial abatement plus applicable surtaxes for the period 1988 to 1994 is approximately 25% for manufacturing corporations and 30% for non-manufacturing corporations.

Table 5-5 Distribution of financial statistics for the entire sample[1]

Decile	Assets	Taxable Income	Federal Part I Tax Liability	Average Tax Rate
1	$33.5	$2.2	$0.6	28.4%
2	$64.7	$2.9	$0.8	27.4%
3	$110.1	$5.2	$1.1	21.3%
4	$206.1	$6.3	$1.5	23.7%
5	$316.9	$4.8	$1.1	23.2%
6	$523.0	$12.2	$2.7	22.1%
7	$958.1	$29.1	$5.0	17.1%
8	$1,634.4	$41.9	$10.0	23.9%
9	$3,063.9	$33.9	$5.6	16.5%
10	$6,041.4	$124.4	$32.1	25.8%

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. Deciles are determined by total assets. Values are in millions of dollars and represent the average value for the decile.

Table 5-6 **Financial statistics for private corporation and public corporation sub-samples**

Financial Variables	Entire Sample[1]	Public Corporations	Private Corporations
Total assets	$1,328.1	$2,021.5	$784.0
		1.52	0.59
Total revenue	$833.6	$898.7	$858.5
		1.08	1.03
Interest expenses	$54.5	$72.3	$39.7
		1.33	0.73
Depreciation expenses	$90.2	$43.0	$17.3
		1.50	0.60
Rental expenses	$2.6	$0.6	$0.6
		0.25	0.24
Salary expenses	$105.3	$145.0	$66.9
		1.38	0.64
Scientific research and experimental development[2]	$2.4	$4.3	$1.5
		1.81	0.65
Taxable income	$26.9	$34.2	$26.2
		1.27	0.97
Investment tax credits	$1.1	$1.6	$0.9
		1.47	0.90
Part I tax liability	$6.2	$7.5	$5.7
		1.20	0.92
Total debt	$530.6	$707.7	$369.3
		1.33	0.70
Average federal Part I tax liability[3]	23%	22%	22%
		0.95	0.94
Average interest rate	10%	10%	11%
		0.99	1.05

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. Dollar amounts are in millions; the second number is the ratio of average total assets of the sub-sample corporations to the average total assets of the corporations in the entire sample. For example, the average public corporation is 1.52 times larger than the average corporation in the total sample while the average private corporation is only 0.59 times the size of the average corporation.
2. Not all corporations have SRED expenditures. The average expenditure in the table is for all corporations and is not the average for only those corporations with SRED expenditures.
3. The average statutory federal tax rate less the provincial abatement plus applicable surtaxes for the period 1988 to 1994 is approximately 25% for manufacturing corporations and 30% for non-manufacturing corporations.

Table 5-7 Financial statistics for location of parent corporation sub-samples

Financial Variables	Entire Sample[1]	Canadian Parent	US Parent	ROW Parent
Total assets	$1,328.1	$1,714.5	$1,838.7	$211.2
		1.29	1.38	0.16
Total revenue	$833.6	$764.1	$1,469.7	$429.0
		0.92	1.76	0.51
Interest expenses	$54.5	$63.0	$81.4	$8.6
		1.15	1.49	0.16
Depreciation expenses	$90.2	$37.6	$37.8	$4.9
		1.31	1.32	0.17
Rental expenses	$2.6	$5.0	$1.3	$0.3
		1.97	0.50	0.11
Salary expenses	$105.3	$145.1	$143.2	$21.5
		1.38	1.36	0.20
Scientific research and experimental development[2]	$2.4	$2.6	$5.0	$0.1
		1.07	2.09	0.04
Taxable income	$26.9	$28.0	$55.3	$2.7
		1.04	2.06	0.10
Investment tax credits	$1.1	$1.0	$2.4	$0.0
		0.97	2.21	0.08
Part I tax liability	$6.2	$6.8	$12.2	$0.7
		1.09	1.96	0.11
Total debt	$530.6	$671.6	$735.3	$60.4
		1.27	1.39	0.11
Average federal Part I tax liability[3]	23%	24%	22%	25%
		1.05	0.95	1.06
Average interest rate	10%	9%	11%	14%
		0.91	1.08	1.38

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. Dollar amounts are in millions; the second number is the ratio relative to total assets of the corporations in the entire sample.
2. Not all corporations have SRED expenditures. The average expenditure in the table is for all corporations and is not the average for only those corporations with SRED expenditures.
3. The average statutory federal tax rate less the provincial abatement plus applicable surtaxes for the period 1988 to 1994 is approximately 25% for manufacturing corporations and 30% for non-manufacturing corporations.

Table 5-8 Financial statistics for manufacturing and non-manufacturing sub-samples

Financial Variables	Entire Sample[1]	Manufacturing	Non-manufacturing
Total assets	$1,328.1	$1,367.1	$1,304.9
		1.03	0.98
Total revenue	$833.6	$1,393.9	$507.2
		1.66	0.61
Interest expenses	$54.5	$37.2	$64.8
		0.68	1.19
Depreciation expenses	$90.2	$40.7	$21.4
		1.42	0.75
Rental expenses	$2.6	$1.0	$3.5
		0.40	1.36
Salary expenses	$105.3	$181.8	$59.9
		1.73	0.57
Scientific research and experimental development[2]	$2.4	$4.9	$0.9
		2.04	0.38
Taxable income	$26.9	$44.1	$16.8
		1.64	0.62
Investment tax credits	$1.1	$1.8	$0.6
		1.72	0.57
Part I tax liability	$6.2	$9.1	$4.5
		1.47	0.72
Total debt	$530.6	$318.0	$656.7
		0.60	1.24
Average federal Part I tax liability[3]	23%	21%	27%
		0.90	1.16
Average interest rate	10%	12%	10%
		1.14	0.96

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. Dollar amounts are in millions; the second number is the ratio relative to total assets of the corporations in the entire sample.
2. Not all corporations have SRED expenditures. The average expenditure in the table is for all corporations and is not the average for only those corporations with SRED expenditures.
3. The average statutory federal tax rate less the provincial abatement plus applicable surtaxes for the period 1988 to 1994 is approximately 25% for manufacturing corporations and 30% for non-manufacturing corporations.

Table 5-9 Jurisdictional presence, statutory tax rates, and tax-to-asset ratios

Country	% of corporations in region	Average Tax-to-Asset Ratio[1]	Average Statutory Tax Rate (1988-1994)	Tax Differential[2]	
				Manufacturing	Non-manufacturing
Australia	57%	0.00978	39.1%	-0.4%	-5.6%
Belgium	39%	0.00798	41.3%	1.8%	-3.4%
Brazil	45%	0.00864	38.4%	-1.2%	-6.4%
France	53%	0.01022	36.1%	-3.4%	-8.6%
Germany	55%	0.00815	58.9%	19.4%	14.2%
Hong Kong	38%	0.00604	17.1%	-22.5%	-27.6%
Ireland	29%	0.00777	10.0%	-29.5%	-34.7%
Italy	45%	0.01008	49.3%	9.8%	4.6%
Japan	40%	0.00898	52.4%	12.9%	7.7%
Mexico	35%	0.01331	36.0%	-3.5%	-8.7%
Netherlands	61%	0.00732	36.0%	-3.5%	-8.7%
New Zealand	26%	0.00862	34.4%	-5.1%	-10.3%
Singapore	34%	0.00664	31.0%	-8.5%	-13.7%
Spain	43%	0.01017	35.0%	-4.5%	-9.7%
Switzerland	36%	0.00794	35.6%	-3.9%	-9.1%
United Kingdom	72%	0.00797	34.0%	-5.5%	-10.7%
United States	95%	0.00860	40.0%	0.5%	-4.7%
Tax Havens	62%	0.00685	0.0%	-39.5%	-44.7%

Source: Author's calculations, based on information collected from Who Owns Whom, Diamond and Diamond (1995), and Revenue Canada Corporation Sample File.

1. Note that a firm with several subsidiaries will be included in more than one group.
2. The tax differential is calculated as the foreign average statutory rate less the Canadian average statutory rate. The average Canadian statutory rate for the period 1988-1994 for manufacturing corporations is 39.5% and for non-manufacturing corporations is 44.7%.

Table 5-10 Percentage of corporations with presence in each jurisdiction

		Ownership		Location of Parent			Manufacturing	
Country	Entire Sample	Private	Public	Canada	United States	Rest of World	Yes	No
Australia	57	83	37	32	77	21	53	60
Belgium	39	61	19	17	53	89	34	42
Brazil	45	72	22	13	73	83	45	45
France	53	82	23	20	77	63	50	55
Germany	55	86	27	21	74	71	45	60
Hong Kong	38	56	21	20	41	83	33	42
Ireland	29	38	24	19	50	89	33	27
Italy	45	66	26	22	67	65	41	47
Japan	40	68	17	9	49	25	36	43
Mexico	35	59	11	10	58	63	36	34
Netherlands	61	80	48	38	74	79	61	61
New Zealand	26	42	15	7	42	54	30	24
Singapore	34	50	22	15	48	82	33	35
Spain	43	74	14	10	66	44	43	43
Switzerland	36	49	23	21	63	53	42	32
United Kingdom	72	89	58	51	91	74	63	78
United States	95	100	92	88	100	35	96	94
Tax Havens	62	76	52	41	87	86	55	66

Source: Author's calculations, based on information collected from Who Owns Whom, Diamond and Diamond (1995), and Revenue Canada Corporation Sample File.

Table 5-11 **Panel data with tax differential dummy variables**
(t-statistics are in brackets[1])

Country	OLS Specification[2]	GMM Specification
Australia	0.00367	0.01591
	(0.6395)	(1.018)
Belgium	0.03403[a1]	0.09103[a1]
	(2.443)	(2.784)
Brazil	-0.00325	-0.03184[c]
	(-0.482)	(-1.792)
France	0.00835[c1]	0.03069[b1]
	(1.335)	(2.006)
Germany	0.00130	-0.03302[a]
	(0.444)	(-4.164)
Hong Kong	0.00400[b1]	0.02191[a1]
	(1.646)	(5.020)
Ireland	-0.00221	0.00437[c1]
	(-1.201)	(1.382)
Italy	-0.00873[c]	-0.00068
	(-1.572)	(-0.059)
Japan	0.00082	0.06355[a1]
	(0.099)	(5.020)
Mexico	-0.01664[a]	-0.01569
	(-2.577)	(-1.036)
Netherlands	0.01597[a1]	0.06579[a1]
	(2.418)	(4.551)
New Zealand	0.00275	-0.02475[b]
	(0.561)	(-2.414)
Singapore	0.02483[a1]	0.03839[a1]
	(5.464)	(4.652)
Spain	-0.03031[a]	-0.10105[a]
	(-4.269)	(-4.852)
Switzerland	0.00693[c1]	0.01443
	(1.351)	(1.213)
United Kingdom	0.00679[c1]	0.02871[b1]
	(1.304)	(1.863)
United States	-0.01509[c]	-0.24409[a]
	(-1.947)	(-7.574)
Tax Havens	-0.00398[a]	-0.00850[a]
	(-3.145)	(-3.451)

continued...

Table 5-11 Panel data with tax differential dummy variables (continued)

Control Variables	OLS Specification	GMM Specification
Tax Variables		
CCA	-0.00605^{c1}	-0.05961^{a1}
	(-1.528)	(-2.734)
Interest Expenses	-0.00767	-0.03882
	(-1.103)	(-1.079)
Rental Expenses	0.00155	-0.06219^{a1}
	(0.178)	(-4.511)
Salary Expenses	0.01184^{a}	0.09369^{a}
	(4.210)	(7.025)
SRED	-0.05600^{c1}	-0.42276^{a1}
	(-1.616)	(-5.890)
Investment Tax Credits	0.07787	-0.19945
	(1.305)	(-0.699)
Loss Carry-forward Use	-0.00860^{b1}	-0.04445^{a1}
	(-2.217)	(-2.7487)
Leverage	-0.00269^{a1}	-0.01107^{a1}
	(-3.289)	(-5.034)
Parent Dummy Variables	Yes	Yes
Industry Dummy Variables	Yes	Yes
R^2	0.3248	0.4063
Number of companies	94	94
Total Observations	658	658

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. The level of significance is denoted by a1, b1, and c1 for significance on a one-tail test at 1%, 5%, and 10% respectively. For a two-tail test, the number 1 is dropped. A one-tail test is used whenever the estimated coefficient has the expected sign; otherwise a two-tail test is used.
2. The OLS specification uses a cross-sectionally heteroskedastic and time-wise autoregressive specification as described in Kmenta (1986, chapter 12). The variances and autocorrelation coefficients used in the variance-covariance matrix are company specific; this matrix scales each cross-section's variables by the variance for that corporation (assuming the variance across all observations for the corporation is constant). In both estimations, we are correcting for the presence of AR(1). The exact specification of both the OLS and GMM estimations are outlined in section 5.

Table 5-12 Magnitude of changes in tax-to-asset ratios and federal tax liabilities for an average tax-paying corporation with a foreign subsidiary—significant coefficients in GMM specification only

	Manufacturing		Non-Manufacturing		Effect per 1% decrease in the tax differential	
	change in tax-to-asset ratio	change in Federal Tax Liability	Change in tax-to-asset ratio	Change in Federal Tax Liability		
Country[1]	%	$ million	%	$ million	%	$ million
Positive Coefficient						
Belgium (H,L)	9.6%	$2.176	(18.2%)	($4.110)	(5.4%)	($1.209)
France (L,L)	(6.1%)	($1.386)	(15.5%)	($3.505)	1.8%	$0.408
Hong Kong (L,L)	(29.0%)	($6.547)	(35.6%)	($8.031)	1.3%	$0.291
Ireland (L,L)	(7.6%)	($1.714)	(8.9%)	($2.014)	0.3%	$0.058
Japan (H,H)	48.2%	$10.888	28.8%	$6.499	(3.7%)	($0.844)
Netherlands (L,L)	(13.5%)	($3.058)	(33.7%)	($7.602)	3.9%	$0.874
Singapore (L,L)	(19.2%)	($4.334)	(30.9%)	($6.985)	2.3%	$0.510
United Kingdom (L,L)	(9.3%)	($2.097)	(18.1%)	($4.080)	1.7%	$0.381
Negative Coefficient						
Brazil (L,L)	2.2%	$0.507	12.0%	$2.705	(1.9%)	($0.423)
Germany (H,H)	(37.7%)	($8.508)	(27.6%)	($6.227)	(1.9%)	($0.439)
New Zealand (L,L)	7.4%	$1.676	15.0%	$3.385	(1.5%)	($0.329)
Spain (L,L)	26.7%	$6.039	57.7%	$13.018	(5.9%)	($1.342)
United States (H,L)	(7.2%)	($1.621)	67.5%	$15.236	14.4%	$3.242
Tax Havens (L,L)	19.8%	$4.462	22.4%	$5.047	(0.5%)	($0.113)

Source: Author's calculations, based on information collected from Who Owns Whom, Diamond and Diamond (1995), and Revenue Canada Corporation Sample File.

1. The terms in the brackets after the country name indicate whether the country is considered high tax or low tax for Canadian-based manufacturing companies and non-manufacturing companies respectively. If a country is low tax, the percentages and dollar amounts should be negative as income shifting would result in a reduced Canadian tax liability; if the country is high tax then the percentages and dollar amounts should be positive.

Table 5-13 **GMM estimation for private and public corporation sub-samples**
(t-statistics are in brackets[1])

Country	Entire Sample	Private Corporations	Public Corporations
Australia	0.01591	0.09340^{a1}	-0.12575^{a}
	(1.018)	(3.575)	(-2.656)
Belgium	0.09103^{a1}	0.04426	-0.16362^{b}
	(2.784)	(0.616)	(-2.466)
Brazil	-0.03184^{c}	-0.13130^{a}	-0.04165
	(-1.792)	(-3.124)	(-1.090)
France	0.03069^{b1}	0.19663^{a1}	0.04593
	(2.006)	(4.965)	(1.198)
Germany	-0.03302^{a}	-0.0683^{a}	0.03287^{a1}
	(-4.164)	(-3.159)	(2.554)
Hong Kong	0.02191^{a1}	0.02111^{a1}	0.04727^{a1}
	(5.020)	(2.647)	(4.183)
Ireland	0.00437^{c1}	-0.00137	-0.20004^{a}
	(1.382)	(-0.190)	(-3.148)
Italy	-0.00068	0.10939^{a1}	-0.02027
	(-0.059)	(4.354)	(-0.872)
Japan	0.06355^{a1}	0.13205^{a1}	0.07499^{a1}
	(5.020)	(4.067)	(2.992)
Mexico	-0.01569	-0.06080^{a}	0.23004^{a1}
	(-1.036)	(-2.873)	(5.738)
Netherlands	0.06579^{a1}	0.10725^{a1}	0.01105
	(4.551)	(2.383)	(0.572)
New Zealand	-0.02475^{b}	-0.04984^{a}	-0.01328
	(-2.414)	(-3.195)	(-0.597)
Singapore	0.03839^{a1}	0.08474^{a1}	-0.02131
	(4.652)	(5.076)	(-1.062)
Spain	-0.10105^{a}	-0.17940^{a}	-0.0298
	(-4.852)	(-5.215)	(-0.668)
Switzerland	0.01443	0.10771^{a1}	-0.00488
	(1.213)	(4.872)	(-0.2578)
United Kingdom	0.02871^{b1}	0.06218^{c1}	0.01627^{c1}
	(1.863)	(1.522)	(1.331)
United States	-0.24409^{a}	-0.38805^{a}	-0.07225^{a}
	(-7.574)	(-5.684)	(-2.797)
Tax Havens	-0.00850^{a}	-0.00526	0.01489^{b1}
	(-3.451)	(-0.930)	(2.240)

continued...

Table 5-13 GMM estimation for private and public corporation sub-samples (continued)

	Entire Sample	Private Corporations	Public Corporations
Tax Variables			
CCA	-0.05961^{a1}	-0.42706^{a1}	0.10445^{c}
	(-2.734)	(-5.605)	(1.773)
Interest Expenses	-0.03882	-0.00435	0.11582
	(-1.079)	(-0.075)	(0.923)
Rental Expenses	-0.06219^{a1}	-0.03696^{a1}	-7.7157^{a1}
	(-4.511)	(-2.769)	(-2.387)
Salary Expenses	0.09369^{a}	0.20189^{a}	-0.00902
	(7.025)	(5.362)	(-0.656)
SRED	-0.42276^{a1}	-0.81574^{a1}	-0.13188
	(-5.890)	(-5.587)	(-0.752)
Investment Tax Credits	-0.19945	0.12241	5.8234^{a}
	(-0.699)	(0.318)	(2.458)
Loss Carry-forward Use	-0.04445^{a1}	-0.09481^{a1}	0.10225^{b}
	(-2.7487)	(-4.351)	(2.550)
Leverage	-0.01107^{a1}	-0.01008^{a1}	-0.02226^{a1}
	(-5.034)	(-2.925)	(-2.419)
Parent Dummy Variables	Yes	Yes	Yes
Industry Dummy Variables	Yes	Yes	Yes
Number of companies	94	45	34
Total Observations	658	315	272

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. The level of significance is denoted by a1, b1, and c1 for significance on a one-tail test at 1%, 5%, and 10% respectively. For a two-tail test, the number 1 is dropped. A one-tail test is used whenever the estimated coefficient has the expected sign; otherwise a two-tail test is used.

Table 5-14 **GMM estimation for location of parent sub-samples**
(t-statistics are in brackets[1])

Country	Entire Sample	Canada Parent	US Parent	ROW Parent
Australia	0.01591	-0.09973^{a}	0.44580^{a1}	0.02095
	(1.018)	(-4.213)	(3.912)	(0.902)
Belgium	0.09103^{a1}	-0.08782	-4.2282^{a}	0.03957
	(2.784)	(-1.268)	(-3.358)	(0.742)
Brazil	-0.03184^{c}	-0.00640	-1.6326^{a}	0.03680
	(-1.792)	(-0.339)	(-3.847)	(0.808)
France	0.03069^{b1}	0.00362	0.30849^{a1}	0.08928^{a1}
	(2.006)	(0.189)	(3.496)	(2.757)
Germany	-0.03302^{a}	0.02393^{a1}	0.21007^{b1}	-0.03126
	(-4.164)	(2.246)	(2.093)	(-1.276)
Hong Kong	0.02191^{a1}	-0.00040	-0.04048^{b}	-0.00576
	(5.020)	(-0.058)	(-2.613)	(-0.390)
Ireland	0.00437^{c1}	-0.00082	-0.09563^{a}	-0.02735^{a}
	(1.382)	(-0.199)	(-2.824)	(-2.929)
Italy	-0.00068	-0.03091^{b}	0.44081^{a1}	0.01736
	(-0.059)	(-1.999)	(4.486)	(0.591)
Japan	0.06355^{a1}	-0.15639^{a}	-0.05534	0.02202
	(5.020)	(-3.601)	(-0.888)	(0.367)
Mexico	-0.01569	0.14736^{a1}	1.23530^{a1}	-0.03521^{c}
	(-1.036)	(4.992)	(3.442)	(-1.510)
Netherlands	0.06579^{a1}	0.07113^{a1}	1.79110^{a1}	-0.20810^{a}
	(4.551)	(4.939)	(4.474)	(-3.231)
New Zealand	-0.02475^{b}	-0.06264^{a}	-0.56979^{a}	0.04620^{a1}
	(-2.414)	(-3.918)	(-5.031)	(2.923)
Singapore	0.03839^{a1}	0.04982^{a1}	-0.25643^{a}	0.01766
	(4.652)	(3.382)	(-2.448)	(1.234)
Spain	-0.10105^{a}	-0.02245	0.25637^{c1}	-0.08131^{a}
	(-4.852)	(-1.129)	(1.452)	(-2.944)
Switzerland	0.01443	0.01619	0.17222^{a1}	0.07198^{a1}
	(1.213)	(1.118)	(3.188)	(3.796)
United Kingdom	0.02871^{b1}	0.00328	0.60285^{a1}	0.12621^{a1}
	(1.863)	(0.302)	(2.456)	(3.507)
United States	-0.24409^{a}	-0.06156^{a}	0.74804^{b1}	-0.07202
	(-7.574)	(-3.144)	(1.960)	(-0.966)
Tax Havens	-0.00850^{a}	-0.00803^{a}	-0.33636^{a}	0.01772^{a1}
	(-3.451)	(-2.808)	(-3.257)	(2.782)

continued...

Table 5-14 GMM estimation for location of parent sub-samples (continued)

	Entire Sample	Canada Parent	US Parent	ROW Parent
Tax Variables				
CCA	-0.05961^{a1}	0.15458^{a}	-0.20819^{a1}	0.05849
	(-2.734)	(2.823)	(-2.274)	(0.704)
Interest Expenses	-0.03882	0.27698^{a}	1.1498^{a}	-0.01882
	(-1.079)	(4.179)	(3.091)	(-0.355)
Rental Expenses	-0.06219^{a1}	-0.01533	0.04455^{c}	-0.00142
	(-4.511)	(-0.234)	(1.733)	(-0.047)
Salary Expenses	0.09369^{a}	0.03100^{a}	0.76080^{a}	-0.02054
	(7.025)	(3.765)	(3.862)	(-0.779)
SRED	-0.42276^{a1}	-0.02781	-1.94140^{a1}	-1.45240
	(-5.890)	(-0.184)	(-4.370)	(-1.178)
Investment Tax Credits	-0.19945	4.17980^{a}	-2.96220^{a1}	11.759
	(-0.699)	(3.679)	(-2.771)	(1.504)
Loss Carry-forward Use	-0.04445^{a1}	0.11769^{a}	1.25220^{a}	-0.0072
	(-2.7487)	(2.595)	(3.162)	(-0.407)
Leverage	-0.01107^{a1}	-0.31518^{a1}	-0.02337^{a}	-0.01322^{a1}
	(-5.034)	(-7.971)	(-2.581)	(-4.442)
Parent Dummy Variables	Yes	Yes	Yes	Yes
Industry Dummy Variables	Yes	Yes	Yes	Yes
Number of companies	94	40	34	27
Total Observations	658	280	168	189

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. The level of significance is denoted by a1, b1, and c1 for significance on a one-tail test at 1%, 5%, and 10% respectively. For a two-tail test, the number 1 is dropped. A one-tail test is used whenever the estimated coefficient has the expected sign; otherwise a two-tail test is used.

Table 5-15 **GMM estimation for manufacturing and non-manufacturing sub-samples** (t-statistics are in brackets[1])

Country	Entire Sample	Manufacturing	Non-manufacturing
Australia	0.01591	0.05872^{c1}	0.02928^{b1}
	(1.018)	(1.566)	(1.735)
Belgium	0.09103^{a1}	0.14317^{c1}	-0.00697
	(2.784)	(1.297)	(-0.179)
Brazil	-0.03184^{c}	-0.02280	-0.04414^{a}
	(-1.792)	(-0.518)	(-2.499)
France	0.03069^{b1}	0.01477	0.01360
	(2.006)	(0.307)	(0.822)
Germany	-0.03302^{a}	0.02951^{c1}	-0.00856
	(-4.164)	(1.336)	(-1.018)
Hong Kong	0.02191^{a1}	-0.02057^{c}	0.03180^{a1}
	(5.020)	(-1.951)	(6.313)
Ireland	0.00437^{c1}	-0.01332^{c}	-0.00092
	(1.382)	(-1.852)	(-0.285)
Italy	-0.00068	-0.04451	-0.01509
	(-0.059)	(-1.630)	(-0.983)
Japan	0.06355^{a1}	0.01280	0.14757^{a1}
	(5.020)	(0.713)	(6.699)
Mexico	-0.01569	-0.03972	0.003057
	(-1.036)	(-0.582)	(0.206)
Netherlands	0.06579^{a1}	0.03647	0.00806
	(4.551)	(0.903)	(0.575)
New Zealand	-0.02475^{b}	-0.03467	0.01452
	(-2.414)	(-1.256)	(1.064)
Singapore	0.03839^{a1}	0.08158^{a1}	0.05752^{a1}
	(4.652)	(2.689)	(5.398)
Spain	-0.10105^{a}	0.09092^{c1}	-0.07524^{a}
	(-4.852)	(1.492)	(-3.357)
Switzerland	0.01443	-0.04914	0.01946^{c1}
	(1.213)	(-1.348)	(1.585)
United Kingdom	0.02871^{b1}	0.14647^{a1}	-0.03765^{b}
	(1.863)	(3.111)	(-2.469)
United States	-0.24409^{a}	-0.06980	-0.08583^{a}
	(-7.574)	(-1.052)	(-3.205)
Tax Havens	-0.00850^{a}	-0.01481^{a}	-0.00413
	(-3.451)	(-3.203)	(-1.339)

continued...

Table 5-15 **GMM estimation for manufacturing and non-manufacturing sub-samples (continued)**

	Entire Sample	Manufacturing	Non-manufacturing
Tax Variables			
CCA	-0.05961^{a1}	-0.008652	-0.05311^{a1}
	(-2.734)	(-0.128)	(-2.265)
Interest Expenses	-0.03882	-0.15796^{b1}	0.09857^{a}
	(-1.079)	(-1.826)	(2.782)
Rental Expenses	-0.06219^{a1}	-0.005541	-0.10327^{a1}
	(-4.511)	(-0.287)	(-2.814)
Salary Expenses	0.09369^{a}	-0.00214	0.09211^{a}
	(7.025)	(-0.186)	(4.294)
SRED	-0.42276^{a1}	-0.17219^{b1}	-0.02527
	(-5.890)	(-1.908)	(-0.132)
Investment Tax Credits	-0.19945	1.02500	0.09860
	(-0.699)	(1.099)	(0.529)
Loss Carry-forward Use	-0.04445^{a1}	0.04953	-0.03674^{a1}
	(-2.7487)	(1.432)	(-2.925)
Leverage	-0.01107^{a1}	-0.02586^{a1}	-0.001190
	(-5.034)	(-3.888)	(-0.553)
Parent Dummy Variables	Yes	Yes	Yes
Industry Dummy Variables	Yes	Yes	Yes
Number of companies	94	35	59
Total Observations	658	245	413

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. The level of significance is denoted by a1, b1, and c1 for significance on a one-tail test at 1%, 5%, and 10% respectively. For a two-tail test, the number 1 is dropped. A one-tail test is used whenever the estimated coefficient has the expected sign; otherwise a two-tail test is used.

Table 5-16 Low-tax regional groupings in 1994

Low-tax Regions	Category	Countries
Central America	manufacturing and non-manufacturing	Costa Rica, Dominican Republic, El Salvador, Guatemala, Jamaica, Mexico, St. Lucia
	non-manufacturing only	Honduras, Puerto Rico, Virgin Islands (USA)
South America	manufacturing and non-manufacturing	Argentina, Brazil, Chile, Ecuador, Paraguay, Peru, Uruguay, Venezuela
	non-manufacturing only	Columbia
Africa	manufacturing and non-manufacturing	Ivory Coast, Kenya, Malawi, Mauritius, Nigeria, Senegal, Zambia
	non-manufacturing only	Botswana, Cameroon, Morocco, Zimbabwe
Western Europe	manufacturing and non-manufacturing	Austria, Denmark, Finland, France, Netherlands, Norway, Spain, Sweden, United Kingdom
	non-manufacturing only	Belgium, Greece, Luxembourg, Portugal, Switzerland
Eastern Europe	manufacturing and non-manufacturing	Hungary
	non-manufacturing only	Bulgaria, Former Czech Republic, Poland, Turkey
Asia and the South Pacific	manufacturing and non-manufacturing	Brunei, China, Fiji, Guam, Indonesia, Malaysia, Papua New Guinea, Philippines, Thailand, South Korea
	non-manufacturing only	None
Middle East	manufacturing and non-manufacturing	None
	non-manufacturing only	Egypt
Four Dragons	Hong Kong, South Korea, Singapore, Taiwan	
Tax Havens	Bahamas, Bahrain, Barbados, Belize, Bermuda, Cayman Islands, Channel Islands, Cook Islands, Cyprus, Djibouti, Gibraltar, Grenada, Guernsey, Isle of Man, Jersey, Lebanon, Liberia, Liechtenstein, Macau, Netherlands Antilles, Panama, Seychelles, United Arab Emeritus, United Kingdom Virgin Islands, and Western Somoa.	

Source: Author's calculations, based on information collected from Corporate Taxes: A Worldwide Summary.
If a Canadian non-manufacturing corporation views the country in the region as a low-tax country then a Canadian manufacturing corporation will also view the country in the region as a low-tax country because the Canadian manufacturing tax rate is always lower than the non-manufacturing tax rate. The opposite holds for high-tax regions. If the Canadian manufacturing corporation views the country as a high-tax country in the region, then the non-manufacturing corporations will also view the country as a high-tax country in the region. Therefore, we do not include the manufacturing only category in the low-tax regions and the non-manufacturing only category in the high-tax regions

Table 5-17 High-tax regional groupings in 1994

High-tax Regions	Category	Countries
Central America	manufacturing and non-manufacturing	Trinidad & Tobago
	manufacturing only	Honduras, Puerto Rico, Virgin Islands (USA)
South America	manufacturing and non-manufacturing	None
	manufacturing only	Columbia
Africa	manufacturing and non-manufacturing	Gabon, Ghana, South Africa, Zaire
	manufacturing only	Botswana, Cameroon, Morocco, Zimbabwe
Western Europe	manufacturing and non-manufacturing	Germany, Italy
	manufacturing only	Belgium, Greece, Luxembourg, Portugal, Switzerland
Eastern Europe	manufacturing and non-manufacturing	None
	manufacturing only	Bulgaria, Former Czech Republic, Poland, Turkey
Asia and the South Pacific	manufacturing and non-manufacturing	India, Pakistan
	manufacturing only	None
Middle East	manufacturing and non-manufacturing	Iran, Saudi Arabia
	manufacturing only	Egypt

Source: Author's calculations, based on information collected from Corporate Taxes: A Worldwide Summary.

If a Canadian non-manufacturing corporation views the country in the region as a low-tax country then a Canadian manufacturing corporation will also view the country in the region as a low-tax country because the Canadian manufacturing tax rate is always lower than the non-manufacturing tax rate. The opposite holds for high-tax regions. If the Canadian manufacturing corporation views the country as a high-tax country in the region, then the non-manufacturing corporations will also view the country as a high-tax country in the region. Therefore, we do not include the manufacturing only category in the low-tax regions and the non-manufacturing only category in the high-tax regions

Table 5-18 Jurisdictional presence and average tax rates

	% of corporations in region	Average Tax Rate			
		Manufacturing		Non-manufacturing	
		1987	1994	1987	1994
Canada	100%	45.5%	36.3%	52.8%	44.3%
Low Tax					
United States	77%	40.0%	40.0%	40.0%	40.0%
Central America	44%	39.2%	28.9%	42.0%	32.2%
South America	48%	35.8%	30.9%	37.6%	31.7%
Africa	13%	36.8%	35.0%	42.0%	36.9%
Western Europe	81%	39.5%	31.7%	44.3%	34.3%
Eastern Europe	4%	N/A	36.0%	N/A	48.8%
Four Dragons	47%	27.2%	26.0%	27.2%	26.0%
Asia and South Pacific	37%	36.1%	33.1%	38.9%	33.1%
Middle East	5%	42.5%	40.0%	42.5%	N/A
Australia and New Zealand	58%	N/A	33.0%	47.5%	33.0%
High Tax					
United States	18%	N/A	40.0%	N/A	N/A
Central America	3%	48.5%	41.0%	N/A	45.0%
South America	16%	50.0%	37.5%	N/A	N/A
Africa	7%	51.7%	46.9%	55.2%	46.9%
Western Europe	60%	52.1%	54.2%	62.1%	54.2%
Eastern Europe	10%	48.8%	42.3%	N/A	46.0%
Japan	40%	52.4%	52.4%	52.4%	52.4%
Asia and South Pacific	11%	57.0%	54.1%	67.0%	54.1%
Middle East	13%	N/A	51.1%	N/A	54.8%
Other					
Tax Havens	62%	-	-	-	-
Ireland	29%	10%	10%	10%	10%
South Africa	13%	57.5%	57.5%	47.5%	47.5%

Source: Author's calculations, based on information collected from Corporate Taxes: A Worldwide Summary.

Table 5-19 Canadian-based private and public corporations' presence by jurisdiction

		Ownership		Location of Parent			Manufacturing	
	Entire Sample	Private	Public	Canada	United States	Rest of World	Yes	No
Low Tax								
United States	77%	81%	68%	70%	77%	86%	45%	94%
Central America	44%	66%	14%	16%	73%	57%	43%	44%
South America	48%	71%	21%	15%	71%	76%	44%	50%
Africa	13%	20%	5%	6%	9%	28%	10%	15%
Western Europe	81%	95%	65%	63%	93%	97%	71%	87%
Eastern Europe	4%	7%	2%	2%	7%	6%	3%	5%
Four Dragons	47%	64%	25%	24%	60%	68%	41%	51%
Asia and South Pacific	37%	54%	18%	14%	51%	59%	34%	39%
Middle East	5%	9%	1%	1%	13%	5%	2%	7%
Australia/New Zealand	58%	79%	35%	31%	74%	83%	54%	60%
High Tax								
United States	18%	18%	21%	18%	18%	14%	49%	0%
Central America	3%	5%	1%	1%	8%	2%	7%	1%
South America	16%	24%	6%	3%	32%	21%	25%	11%
Africa	7%	13%	1%	1%	15%	9%	11%	4%
Western Europe	60%	83%	34%	28%	78%	91%	52%	65%
Eastern Europe	10%	16%	4%	2%	22%	12%	16%	7%
Japan	40%	63%	15%	9%	48%	77%	36%	43%
Asia and South Pacific	11%	18%	4%	1%	21%	17%	14%	10%
Middle East	13%	21%	2%	2%	13%	31%	10%	15%
Other								
Tax Havens	62%	73%	47%	41%	84%	71%	55%	66%
Ireland	29%	36%	21%	19%	48%	27%	33%	27%
South Africa	13%	22%	2%	3%	16%	25%	18%	11%

Source: Author's calculations, based on information collected from Who owns Whom *and Diamond and Diamond (1995).*

Table 5-20 Unweighted average tax-to-asset ratio by location of subsidiaries[1]

Location of Subsidiary	Average Tax-to-Asset Ratio	Ratio compared to Group Average
Low Tax		
United States	0.00900	0.92
Central America	0.01475	1.50
South America	0.00981	1.00
Africa	0.00895	0.91
Western Europe	0.00857	0.87
Eastern Europe	0.00825	0.84
Four Dragons	0.00689	0.70
Asia and South Pacific	0.01066	1.09
Middle East	0.00936	0.95
Australia/New Zealand	0.01194	1.22
Average	**0.00982**	
High Tax		
United States	0.00697	0.67
Central America	0.01232	1.18
South America	0.01036	0.99
Africa	0.01273	1.22
Western Europe	0.01015	0.97
Eastern Europe	0.01027	0.99
Japan	0.00898	0.86
Asia and South Pacific	0.01276	1.22
Middle East	0.00924	0.89
Average	**0.01042**	
Other		
Tax Havens	0.00685	
Ireland	0.00777	
South Africa	0.01025	

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. Note that a firm with several subsidiaries will be included in more than one group.

Table 5-21 **Panel data with locational dummy variables**
(t-statistics are in brackets)

	OLS specification	GMM Specification
Low Tax ($\alpha < 0$)		
United States	0.00028	-0.00079
	(0.610)	(-0.309)
Central America	0.00269^{a}	0.00098
	(4.791)	(0.739)
South America	-0.00126^{b1}	0.00068
	(-2.193)	(0.285)
Africa	0.00177	-0.00493^{a1}
	(0.277)	(-3.156)
Western Europe	-0.0097^{c1}	0.00081
	(-1.621)	(0.373)
Eastern Europe	-0.00038	0.00008
	(-0.572)	(0.042)
Four Dragons	-0.00269^{a1}	-0.00724^{a1}
	(-4.139)	(-5.114)
Asia and South Pacific	-0.00027	-0.00847^{b1}
	(-0.484)	(-1.768)
Middle East	-0.00131^{c1}	0.00287
	(-1.608)	(0.993)
High Tax($\alpha > 0$)		
United States	-0.00213^{a}	-0.00739^{a}
	(-2.896)	(-3.928)
Central America	0.00277^{b1}	0.00930^{a1}
	(1.924)	(3.066)
South America	-0.00014	-0.00060
	(-0.266)	(-0.510)
Africa	0.00245^{a1}	-0.00759^{b}
	(2.766)	(-2.120)
Western Europe	-0.00018	0.00334
	(-0.777)	(1.200)
Eastern Europe	0.00051	-0.00147
	(0.844)	(-0.529)
Japan	0.00035	0.00169
	(0.427)	(0.935)
Asia and South Pacific	-0.00074	0.00449^{a1}
	(-1.083)	(2.191)
Middle East	-0.00017	0.00772^{a1}
	(-0.214)	(3.379)

continued...

Table 5-21 **Panel data with locational dummy variables**
(t-statistics are in brackets)

	OLS specification	GMM Specification
Tax Havens	0.00036	-0.00437^{b1}
	(0.971)	(-1.916)
Ireland	-0.00073	0.01142^{b}
	(-1.104)	(2.146)
South Africa	0.00002	-0.00643^{b}
	(0.050)	(-2.111)
Australia/New Zealand	-0.00026	0.00323
	(-0.484)	(1.481)
Control Variables		
CCA	-0.00398	-0.20851^{a1}
	(-0.990)	(-2.968)
Interest Expenses	-0.00463	-0.09405^{b1}
	(-0.902)	(-1.856)
Rental Expenses	-0.00108	-1.2613^{a1}
	(-0.146)	(-2.660)
Salary Expenses	0.00846^{a}	0.16761^{a}
	(2.814)	(4.839)
SRED	-0.05817^{b1}	-0.66347^{a1}
	(-1.691)	(-5.859)
Investment Tax Credits	0.09770	-0.89171^{b1}
	(1.378)	(-2.170)
Loss Carry-forward Use	-0.00793^{b1}	-0.13340^{a1}
	(-2.060)	(-2.805)
Leverage	-0.00161^{a1}	-0.00339
	(-2.571)	(-1.017)
Parent Dummy Variables	Yes	Yes
Industry Dummy Variables	Yes	Yes
Number of companies	94	94
Total Observations	658	658

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. The level of significance is denoted by a1, b1, and c1 for significance on a one-tail test at 1%, 5%, and 10% respectively. For a two-tail test, the number 1 is dropped. A one-tail test is used whenever the estimated coefficient has the expected sign; otherwise a two-tail test is used.

Table 5-22 Magnitude of changes in tax-to-asset ratios from adding a subsidiary in the region—significant coefficients in regional GMM specification only

Region	change in tax-to-asset ratio %	change in Federal Tax Liability $ million
Correct sign on coefficient[1]		
Low-tax Africa	(29.0%)	($6.548)
Four Dragons	(42.6%)	($9.615)
Low-tax Asia and the South Pacific	(49.8%)	($11.249)
High-tax Central America	54.7%	$12.351
High-tax Asia and the South Pacific	26.4%	$5.963
High-tax Middle East	45.4%	$10.253
Tax Havens	(25.7%)	($5.804)
Incorrect sign on coefficient		
High-tax United States	(43.9%)	($9.815)
High-tax Africa	(44.6%)	($10.080)
Ireland	67.2%	$15.167
South Africa	(37.8%)	($8.540)

Source: *Author's calculations, based on information collected from Who Owns Whom, Diamond and Diamond (1995), and Revenue Canada Corporation Sample File.*

[1] Income shifting to take advantage of international tax differentials would suggest that the Canadian tax liability would be lower when there is a subsidiary in a low-tax jurisdiction and higher when there is a subsidiary in a high-tax jurisdiction.

Table 5-23 **GMM estimation of regional specification for private and public corporations** (t-statistics are in brackets[1])

	Entire Sample	Private Corporations	Public Corporations
Low Tax			
United States	-0.00079	-0.14108^{a1}	0.00467^{a1}
	(-0.309)	(-2.639)	(2.606)
Central America	0.00098	-0.06107^{a1}	0.00355
	(0.739)	(-3.169)	(1.106)
South America	0.00068	0.05613^{a}	0.02088^{b}
	(0.285)	(3.272)	(2.228)
Africa	-0.00493^{a1}	0.0474^{a}	-0.00784^{a1}
	(-3.156)	(3.373)	(-3.209)
Western Europe	0.00081	0.08758^{a}	-0.00596^{a1}
	(0.373)	(2.414)	(-2.385)
Eastern Europe	0.00008	-0.01491^{b1}	0.00396^{a}
	(0.042)	(-2.150)	(2.695)
Four Dragons	-0.00724^{a1}	-0.06601^{a1}	-0.00941^{a1}
	(-5.114)	(-3.770)	(-4.039)
Asia and South Pacific	-0.00847^{b1}	-0.11106^{a1}	0.01421^{a}
	(-1.768)	(-3.212)	(5.021)
Middle East	0.00287	0.09328^{a}	no subsidiaries
	(0.993)	(3.540)	
High Tax			
United States	-0.00739^{a}	-0.09987^{a}	-0.00391^{c}
	(-3.928)	(-2.657)	(-1.679)
Central America	0.00930^{a1}	-0.07178^{a}	-0.01791^{a}
	(3.066)	(-2.759)	(-3.011)
South America	-0.00060	0.02203^{a1}	0.00738^{b1}
	(-0.510)	(3.728)	(1.873)
Africa	-0.00759^{b}	0.02238^{a1}	-0.02139^{c}
	(-2.120)	(3.539)	(-1.824)
Western Europe	0.00334	0.03417^{a1}	0.00103
	(1.200)	(2.949)	(0.406)
Eastern Europe	-0.00147	0.02126^{a1}	0.00046
	(-0.529)	(5.233)	(0.087)
Japan	0.00169	-0.11262^{a}	-0.04693^{a}
	(0.935)	(-3.611)	(-2.587)
Asia and South Pacific	0.00449^{a1}	0.04973^{a1}	0.04675^{a1}
	(2.191)	(3.529)	(2.551)
Middle East	0.00772^{a1}	0.06404^{a1}	-0.00462
	(3.379)	(3.675)	(-0.871)

continued...

Table 5-23 **GMM estimation of regional specification for private and public corporations (continued)**

	Entire Sample	Private Corporations	Public Corporations
Tax Havens	-0.00437^{c}	-0.06190^{a1}	-0.00783^{a1}
	(-1.916)	(-3.734)	(-2.785)
Ireland	0.01142^{b}	0.17794^{a}	-0.01007^{c1}
	(2.146)	(3.437)	(-1.430)
South Africa	-0.00643^{b}	-0.08917^{a}	-0.01137^{b}
	(-2.111)	(-3.545)	(-1.990)
Australia/New Zealand	0.00323	0.10786^{a}	-0.002187
	(1.481)	(3.103)	(-0.693)
Control Variables			
CCA	-0.20851^{a1}	-0.07594	-0.51224^{b1}
	(-2.968)	(-0.895)	(1.841)
Interest Expenses	-0.09405^{b1}	-1.1397^{a1}	0.1148
	(-1.856)	(-3.317)	(0.615)
Rental Expenses	-1.2613^{a1}	-6.1778^{a1}	36.449^{a}
	(-2.660)	(-3.525)	(2.789)
Salary Expenses	0.16761^{a}	0.15273^{a}	0.09629^{a}
	(4.839)	(5.590)	(2.578)
SRED	-0.66347^{a1}	-6.57530^{a1}	0.95833^{b}
	(-5.859)	(-3.691)	(2.081)
Investment Tax Credits	-0.89171^{b1}	-14.4050^{a1}	3.30640^{b}
	(-2.170)	(-3.595)	(2.311)
Loss Carry-forward Use	-0.13340^{a1}	0.93936^{a}	0.05033
	(-2.805)	(2.920)	(0.509)
Leverage	-0.00339	-0.05831^{a1}	-0.02276
	(-1.017)	(-2.932)	(-1.151)
Parent Dummy Variables	Yes	Yes	Yes
Industry Dummy Variables	Yes	Yes	Yes
Number of companies	94	45	34
Total Observations	658	315	238

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. The level of significance is denoted by a1, b1, and c1 for significance on a one-tail test at 1%, 5%, and 10% respectively. For a two-tail test, the number 1 is dropped. A one-tail test is used whenever the estimated coefficient has the expected sign; otherwise a two-tail test is used.

Table 5-24 **GMM estimation for location of parent sub-samples**
(t-statistics are in brackets[1])

	Entire Sample	Canada Parent	US Parent	ROW Parent
Low Tax				
United States	-0.00079	0.05119^{a}	0.03369	-0.00306
	(-0.309)	(4.023)	(1.036)	(-0.312)
Central America	0.00098	-0.07241^{a1}	0.00481	0.00877^{a}
	(0.739)	(-3.405)	(0.310)	(3.148)
South America	0.00068	0.12192^{a}	-0.00824	0.00623^{b}
	(0.285)	(3.653)	(-1.064)	(2.184)
Africa	-0.00493^{a1}	-0.07834^{a1}	0.02635^{c}	0.00239
	(-3.156)	(-3.636)	(1.723)	(1.076)
Western Europe	0.00081	-0.00903^{a1}	-0.07951^{a1}	-0.00448
	(0.373)	(-4.028)	(-3.246)	(-0.698)
Eastern Europe	0.00008	0.12709^{a}	-0.00597^{c1}	0.00483
	(0.042)	(3.701)	(-1.378)	(1.378)
Four Dragons	-0.00724^{a1}	0.04648^{a}	-0.01450^{b1}	-0.00071
	(-5.114)	(3.093)	(-1.995)	(-0.293)
Asia and South Pacific	-0.00847^{b1}	0.04462^{a}	-0.01322	-0.00657^{b1}
	(-1.768)	(4.300)	(-0.377)	(-2.157)
Middle East	0.00287	-0.24258^{a1}	-0.00362	-0.00323
	(0.993)	(-3.193)	(-0.251)	(-0.532)
High Tax				
United States	-0.00739^{a}	0.05970^{a1}	0.02927	-0.00741
	(-3.928)	(3.848)	(0.984)	(-0.837)
Central America	0.00930^{a1}	-0.12493^{a}	0.01436^{c1}	0.0148^{b1}
	(3.066)	(-3.668)	(1.309)	(2.268)
South America	-0.00060	-0.16198^{a}	0.00308	-0.00088
	(-0.510)	(-3.641)	(0.534)	(-0.546)
Africa	-0.00759^{b}	-0.08673^{a}	-0.01034^{b}	0.00964^{a1}
	(-2.120)	(-3.676)	(-2.093)	(2.900)
Western Europe	0.00334	-0.01318^{a}	0.01329	-0.00467
	(1.200)	(-3.628)	(0.807)	(-1.642)
Eastern Europe	-0.00147	0.04564^{a1}	0.00473	0.00160
	(-0.529)	(3.175)	(0.508)	(0.707)
Japan	0.00169	-0.22327^{a}	0.00397	-0.00601
	(0.935)	(-3.746)	(0.525)	(-1.042)
Asia and South Pacific	0.00449^{a1}	0.28912^{a1}	-0.00325	0.00367^{c1}
	(2.191)	(3.667)	(-0.368)	(1.352)
Middle East	0.00772^{a1}	-0.29479^{a}	0.01932^{a1}	-0.00399
	(3.379)	(-3.332)	(2.558)	(-1.309)

continued...

Table 5-24 **GMM estimation for location of parent sub-samples (continued)**

	Entire Sample	Canada Parent	US Parent	ROW Parent
Tax Havens	-0.00437^{b1}	-0.04779^{a1}	0.01995	-0.00829^{a1}
	(-1.916)	(-3.495)	(0.956)	(-3.208)
Ireland	0.01142^{b}	-0.06268	0.01887	-0.00108
	(2.146)	(-3.719)	(1.523)	(-0.247)
South Africa	-0.00643^{b}	-0.08530^{a}	-0.01708	0.00191
	(-2.111)	(-3.531)	(-0.794)	(0.593)
Australia/New Zealand	0.00323	0.02286^{a}	0.02165	0.00965^{b}
	(1.481)	(3.687)	(0.931)	(2.431)
Control Variables				
CCA	-0.20851^{a1}	-1.36830^{a1}	-0.28669	-0.02577
	(-2.968)	(-3.277)	(-1.060)	(-0.331)
Interest Expenses	-0.09405^{b1}	6.28520^{a}	0.04173	0.09650
	(-1.856)	(3.558)	(0.282)	(1.396)
Rental Expenses	-1.2613^{a1}	-0.51020^{a1}	-0.68317^{b1}	-0.09597
	(-2.660)	(-3.042)	(-1.914)	(-0.627)
Salary Expenses	0.16761^{a}	0.22580^{a}	0.28188^{a}	-0.0285
	(4.839)	(4.004)	(3.916)	(-0.991)
SRED	-0.66347^{a1}	1.1328^{a}	-1.53850^{b1}	2.56390^{a}
	(-5.859)	(2.589)	(-2.183)	(2.795)
Investment Tax Credits	-0.89171^{b1}	50.014^{a}	-1.11310	3.96420
	(-2.170)	(3.772)	(-0.964)	(1.214)
Loss Carry-forward Use	-0.13340^{a1}	-0.32250^{a1}	0.90983	-0.03836
	(-2.805)	(-2.643)	(1.446)	(-0.681)
Leverage	-0.00339	-0.70102^{a1}	0.02022	-0.01609^{b1}
	(-1.017)	(-3.611)	(0.578)	(-2.069)
Parent Dummy Variables	Yes	Yes	Yes	Yes
Industry Dummy Variables	Yes	Yes	Yes	Yes
Number of companies	94	40	34	27
Total observations	658	280	168	189

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. The level of significance is denoted by a1, b1, and c1 for significance on a one-tail test at 1%, 5%, and 10% respectively. For a two-tail test, the number 1 is dropped. A one-tail test is used whenever the estimated coefficient has the expected sign; otherwise a two-tail test is used.

Table 5-25 **GMM estimation of regional specification for manufacturing and non-manufacturing corporations** (t-statistics are in brackets[1])

	Entire Sample	Manufacturing	Non-Manufacturing
Low Tax			
United States	-0.00079	0.00798	-0.00462[b1]
	(-0.309)	(1.239)	(-2.086)
Central America	0.00098	0.02755	0.00941[a]
	(0.739)	(0.875)	(5.941)
South America	0.00068	0.00417	-0.00167
	(0.285)	(0.462)	(-0.856)
Africa	-0.00493[a1]	0.00198	-0.00668[a1]
	(-3.156)	(0.138)	(-2.960)
Western Europe	0.00081	-0.01269	0.00188
	(0.373)	(-1.039)	(0.829)
Eastern Europe	0.00008	0.01634	0.00066
	(0.042)	(0.865)	(0.396)
Four Dragons	-0.00724[a1]	-0.0465	-0.00925[a1]
	(-5.114)	(-0.872)	(-4.458)
Asia and South Pacific	-0.00847[b1]	0.10170	-0.00747[a1]
	(-1.768)	(0.861)	(-2.701)
Middle East	0.00287	-0.09945	0.00608[b]
	(0.993)	(-0.926)	(2.333)
High Tax			
United States	-0.00739[a]	-0.00253	no subsidiaries
	(-3.928)	(-0.750)	
Central America	0.00930[a1]	0.04959	0.00257
	(3.066)	0.923)	(0.720)
South America	-0.00060	0.00864	-0.00341[b]
	(-0.510)	(0.474)	(-1.908)
Africa	-0.00759[b]	-0.00892	-0.00581
	(-2.120)	(-0.518)	(-1.485)
Western Europe	0.00334	-0.00094	0.00664[a1]
	(1.200)	(-0.114)	(2.426)
Eastern Europe	-0.00147	0.03573	-0.00012
	(-0.529)	(0.857)	(-0.083)
Japan	0.00169	-0.03919	0.00401[b1]
	(0.935)	(-0.837)	(1.821)
Asia and South Pacific	0.00449[a1]	0.03330	0.00331[b1]
	(2.191)	(1.185)	(1.972)
Middle East	0.00772[a1]	0.00880	0.00481[b1]
	(3.379)	(0.659)	(1.776)

continued...

Table 5-25 GMM estimation of regional specification for manufacturing and non-manufacturing corporations (continued)

	Entire Sample	Private Corporations	Public Corporations
Tax Havens	-0.00437^{c}	0.04483	0.00050
	(-1.916)	(0.937)	(0.357)
Ireland	0.01142^{b}	-0.07310	0.00218
	(2.146)	(0.800)	(0.804)
South Africa	-0.00643^{b}	-0.00386	0.00218
	(-2.111)	(-1.129)	(0.954)
Australia/New Zealand	0.00323	-0.02028	0.00070
	(1.481)	(0.782)	(0.409)
Control Variables			
CCA	-0.20851^{a1}	0.93604	-0.08219^{b1}
	(-2.968)	(0.862)	(-2.114)
Interest Expenses	-0.09405^{b1}	1.13030	0.12910^{a}
	(-1.856)	(0.826)	(3.441)
Rental Expenses	-1.2613^{a1}	2.85820	-0.60188^{a1}
	(-2.660)	(0.837)	(-2.420)
Salary Expenses	0.16761^{a}	0.04684	0.13216^{a}
	(4.839)	(0.751)	(3.543)
SRED	-0.66347^{a1}	2.431	-2.56100^{a1}
	(-5.859)	(0.784)	(-3.405)
Investment Tax Credits	-0.89171^{b1}	4.71520	0.52942^{b}
	(-2.170)	(1.255)	(2.449)
Loss Carry-forward Use	-0.13340^{a1}	-0.53366	-0.14126^{a1}
	(-2.805)	(-0.569)	(-2.848)
Leverage	-0.00339	0.00908	0.01468^{a}
	(-1.017)	(0.141)	(2.682)
Parent Dummy Variables	Yes	Yes	Yes
Industry Dummy Variables	Yes	Yes	Yes
Number of companies	94	35	59
Total Observations	658	245	413

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. The level of significance is denoted by a1, b1, and c1 for significance on a one-tail test at 1%, 5%, and 10% respectively. For a two-tail test, the number 1 is dropped. A one-tail test is used whenever the estimated coefficient has the expected sign; otherwise a two-tail test is used.

Table 5-26 Summary of results: correct versus incorrect results in tax differential specifications

Country	Entire Sample	Private Corporations	Public Corporations	Canada Parent	US Parent	ROW Parent	Manufacturing	Non-manufacturing	Total	
									Consistent	Inconsistent
Australia		Consistent	Inconsistent		Consistent		Consistent	Consistent	4	1
Belgium	Consistent		Inconsistent	Consistent	Inconsistent		Consistent		3	2
Brazil	Inconsistent	Inconsistent		Inconsistent	Inconsistent			Inconsistent	0	5
France	Consistent	Consistent		Consistent	Consistent	Consistent			5	0
Germany	Inconsistent	Inconsistent	Consistent	Inconsistent	Consistent		Consistent		3	3
Hong Kong	Consistent	Consistent	Consistent	Consistent	Inconsistent		Inconsistent	Consistent	5	2
Ireland	Consistent		Inconsistent	Consistent	Inconsistent	Inconsistent	Inconsistent		2	3
Italy		Consistent			Consistent				2	0
Japan	Consistent	Consistent	Consistent	Consistent				Consistent	5	0
Mexico		Inconsistent	Consistent		Consistent	Inconsistent			2	2
Netherlands	Consistent	Consistent		Consistent	Consistent	Inconsistent			4	1
New Zealand	Inconsistent	Inconsistent		Inconsistent	Inconsistent	Consistent			1	4
Singapore	Consistent	Consistent		Consistent	Inconsistent		Consistent	Consistent	5	1
Spain	Inconsistent	Inconsistent			Consistent	Inconsistent	Consistent	Inconsistent	2	4
Switzerland		Consistent			Consistent	Consistent		Consistent	4	0
United Kingdom	Consistent	Consistent	Consistent		Consistent	Consistent	Consistent	Inconsistent	6	1
United States	Inconsistent	Inconsistent	Inconsistent	Inconsistent	Consistent			Inconsistent	1	5
Tax Havens	Inconsistent		Consistent	Inconsistent	Inconsistent	Consistent	Inconsistent		2	4

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. Results are from GMM specifications.

Table 5-27 Summary of results: correct versus Inconsistent results in locational dummy variable specifications

Country	Entire Sample	Private Corporations	Public Corporations	Canada Parent	US Parent	ROW Parent	Manufacturing	Non-manufacturing	Total	
									Consistent	Inconsistent
Low Tax Jurisdictions										
United States		Consistent	Inconsistent	Inconsistent				Consistent	2	2
Central America		Consistent		Consistent		Inconsistent		Inconsistent	2	2
South America		Inconsistent	Inconsistent	Inconsistent		Inconsistent			0	4
Africa	Consistent	Inconsistent	Consistent	Consistent	Inconsistent			Consistent	4	1
Western Europe		Inconsistent	Consistent	Consistent	Consistent				3	1
Eastern Europe		Consistent	Inconsistent	Inconsistent	Consistent				2	2
Four Dragons	Consistent	Consistent	Consistent	Inconsistent	Consistent			Consistent	5	1
Asia and the South Pacific	Consistent	Consistent	Inconsistent	Inconsistent		Consistent		Consistent	4	1
Middle East		Inconsistent		Consistent				Inconsistent	1	2

Table 5-27 Summary of results: correct versus Inconsistent results in locational dummy variable specifications (continued)

Country	Entire Sample	Private Corporations	Public Corporations	Canada Parent	US Parent	ROW Parent	Manufacturing	Non-manufacturing	Total Consistent	Total Inconsistent
High Tax Jurisdictions										
United States	Inconsistent	Inconsistent	Inconsistent	Consistent					1	3
Central America	Consistent	Inconsistent	Inconsistent	Inconsistent	Consistent	Consistent			3	3
South America		Consistent	Consistent	Inconsistent				Inconsistent	2	1
Africa	Inconsistent	Consistent	Inconsistent	Inconsistent	Inconsistent	Consistent			2	4
Western Europe		Consistent		Inconsistent				Consistent	2	1
Eastern Europe		Consistent		Consistent					2	0
Japan		Inconsistent	Inconsistent	Inconsistent				Consistent	1	3
Asia and the South Pacific	Consistent	Consistent	Consistent	Consistent		Consistent		Consistent	6	0
Middle East	Consistent			Inconsistent	Consistent			Consistent	3	1
Tax Havens	Consistent	Consistent	Consistent	Consistent		Consistent			5	0
Ireland	Inconsistent	Inconsistent	Consistent						1	2
South Africa	Inconsistent	Inconsistent	Inconsistent	Inconsistent					0	4
Australia/New Zealand		Inconsistent		Inconsistent		Inconsistent			0	3

Source: Author's calculations based on Revenue Canada Corporation Sample File.

1. Results are from GMM specifications.

CHAPTER 6
CONCLUSIONS

This dissertation addresses some of the key issues associated with the taxation of capital income in an integrated world economy with an emphasis on MNEs. In particular, we examine the ability of MNEs to shift before-tax income between jurisdictions in an effort to take advantage of differences in international tax rates.

This dissertation makes both theoretical and empirical contributions to the existing literature. On the theoretical front, we expand the existing literature by developing a model that explains the income shifting behaviour of the MNE. We have specifically developed the model to include both home- and host-country corporate tax rates and withholding taxes along with other aspects of the tax system such as the deductibility of interest and depreciation expenses. Unlike other studies, instead of assuming the that the host-country tax rate is higher than the home country tax rate, we allow for any relationship between these two rate by allowing the parent corporation to be in a surplus or deficit foreign tax credit position with respect to the income received from the foreign subsidiary. Unlike the previous literature, we also impose a thin capitalisation constraint on the corporation.

The key contributions of the theoretical chapter are as follows. First, when the parent corporation is in a surplus foreign tax credit position, the foreign subsidiary will shift as much pre-tax income as possible to the parent corporation, thus reducing the global tax liability and also reducing the user cost of capital. The income flows are reversed when the parent corporation is in a deficit foreign tax credit position.

Second, the optimal financial policy is independent of the foreign tax credit position of the parent corporation and the thin capitalisation restriction is only binding if the parent corporation's discount rate exceeds the net cost of borrowing. Further, depending upon the source of finance used by the parent corporation, the home country tax rate may not affect the financing decision of the foreign subsidiary. If debt and equity financing are used, it is still possible for the thin capitalisation constraint to be binding when the home country tax rate exceeds the hose country tax rate.

Finally, an interesting result in our model involves the effect of a change in the host-country tax rate on the user cost of capital. It is possible that an increase in the host-country tax rate can actually *decrease* the user cost of capital provided that it is possible to shift pre-tax income from the foreign subsidiary to the parent corporation. This result suggests that once a MNE has incorporated a subsidiary in a foreign jurisdiction, it is possible that higher tax rates in the foreign jurisdiction can actually lower the user cost of capital. This result comes from the ability of the MNE to avoid the higher tax rate on the pre-tax income that is shifted to the parent corporation while still claiming deductions in the foreign jurisdiction for interest and depreciation expenses. At the higher tax rate, these deductions are more valuable. Provided enough income can be shifted, the user cost of capital declines. This result directly contradicts the conventional wisdom of Hartman (1985).

On the empirical front, we analyse the income shifting behaviour MNEs with a Canadian presence. The analysis utilises a very unique and untapped data source. The data is confidential and contains financial information about the corporations that is not normally available to researchers such as the federal tax liability, the capital consumption allowance claimed, research and development expenditures, and actual salary expenses. Further, this unconsolidated data overcomes the problem that public firm-level data in Canada is typically provided on a consolidated basis. Access to data from the Canadian Department of Finance has allowed us to empirically examine an important taxation issue that has received little attention in Canada.

We find that there is some evidence that MNEs with a presence in Canada are shifting income to subsidiaries located in low-tax jurisdictions. An analysis of various sub-samples suggests that privately owned Canadian-based corporations are undertaking income shifting to a larger degree than public Canadian-based corporations. It also appears that Canadian-based corporations with a parent located in the United States are able to shift more income than corporations with a parent located in Canada or other jurisdictions.

We also find that income shifting depends upon the size of the tax differential and that the effect of a one percent change in the tax differential is not constant across jurisdictions. For example, a one percent change in the tax differential will have a larger affect on the Canadian tax liability if the subsidiary is located in Hong Kong than if the subsidiary is located in Ireland. Further, the amount of shifted income can be substantial. By adding a subsidiary in a low-tax jurisdiction such as Hong Kong, the Canadian tax liability can be reduced by as much as 36% or about $8 million for a representative corporation.

Our findings have some important policy implications for Canada. First, the magnitude of the income shifting potential suggests that the Canada Customs and Revenue Agency (CCRA) is justified in devoting resources to transfer pricing audits in an effort to eliminate abusive pricing behaviour. However, even if the CCRA's efforts ensure that all transactions are priced at the arm's-length price, a MNE can still shift income to low-tax jurisdictions by strategically locating income-generating activities (*e.g.*, marketing and sales to the consumer) in low-tax jurisdictions and expense-generating activities (*e.g.*, research and development) in high-tax jurisdictions. By lowering Canadian corporate tax rates, the incentives to shift income away from Canada are reduced. More income will be reported in Canada and the tax base from MNE's will increase. Therefore, it is possible that lower tax rates can generate more tax revenue from MNEs. The question that remains to be examined is the effect of reduced tax rates on the revenues generated from Canadian corporations with purely domestic operations since their tax base will not increase since income shifting is not possible for this group.

The field of international taxation is becoming more important in a global economy. The taxation of MNEs and the ability of MNEs to strategically structure their operations and manoeuvre income between high-tax and low-tax jurisdictions has serious implications on domestic tax policy. While our research makes a contribution to the existing research on income shifting, transfer pricing, and the taxation of MNES, there is considerable potential for further research in this area both on a theoretical and an empirical front.

There is a tremendous potential for future work in the area of income shifting and transfer pricing. The key to empirical analysis is access to high quality firm-level data. In general, this data will only be available from internal corporate financial statements since the level of detail necessary to undertake the research is not available from public data sources. Depending upon the level of detail collected by tax authorities, it may be possible to find sufficient data from corporate tax returns.

Most notably, empirical research can focus on extending our model in ways outlined in section 5-11 by incorporating tariffs into the model and dealing with collecting financial information on the foreign operations of the MNE.
Econometrically, a Tobit specification can be investigated. However, while there is a literature on Tobit specifications with panel data and endogenous variables and panel data, there is little econometric literature on Tobit specifications with panel data and endogenous variables.

Our research does not focus on the repatriation of after-tax income through the issuing of dividends. This area has received some attention in literature, but more research can be done. In particular, it would be interesting to develop a system of equations that takes into account the pre-tax income shifting behaviour of the MNE along with the post-tax income repatriation behaviour of the MNE.

Theoretically, there are several areas where our research can be extended. First, more work can be done on the thin capitalisation constraint. There is little economic literature on this constraint to the financing of a MNE. To incorporate the thin capitalisation constraint, we made a simplifying assumption that the debt to equity ratio must not exceed some ratio. In practice, not all debt is included in the constraint—only debt held by a related party is counted when determining if the corporation is satisfying the constraint. The constraint in our model can be revised to incorporate this distinction in the type of debt in the calculation. First, the debt variable would need to be redefined to allow for both types of debt. Second, the interest expense would need to be specifically modelled as a cross-border charge as the payment would be made to the parent corporation.

Second, we assume that cross-border charges only include interest and royalty expenses and intangible services such as management fees; we assume no intangible goods are shifted. We also assume there are no tariffs in the model since there are no tangible goods moving across countries. An obvious extension of our model is to incorporate tangible goods, and subsequently tariffs, into the specification. This extension can draw on the intra-firm trade literature.

Finally, it would be interesting to deal with other methods of relief from double taxation. The model could be respecified to deal with both deduction and exemption systems to determine if the results in the credit system that we model will hold in the other systems.

APPENDIX 1
A MODEL OF THE BEHAVIOUR OF A MULTINATIONAL ENTERPRISE

Equation numbering starts at (4.5) to match equation numbering in section 4-3.

The stream of dividends for the foreign subsidiary is

$$D_t^* = f\left(K_t^*\right) - C_t^* - \left(K_t^* - K_{t-1}^*\right) - \delta^* K_{t-1}^* + B_t^* - B_{t-1}^* - iB_{t-1}^* - T_t^* \tag{4.5}$$

The corporate tax liability of the foreign subsidiary is

$$T_t^* = \tau^* \left[f\left(K_t^*\right) - C_t^* - iB_{t-1}^* - \alpha^* \hat{K}_t^* \right] + \left(\tau^{k^*} - \phi^*\right) K_t^* + \phi^* K_{t-1}^* \tag{4.6}$$

The undepreciated capital cost base is

$$\begin{aligned} \hat{K}_t^* &= \left(1-\alpha^*\right)\hat{K}_{t-1}^* + \left(K_t^* - K_{t-1}^*\right) - \phi^*\left(K_t^* - K_{t-1}^*\right) + \delta K_{t-1}^* - \phi^* \delta K_{t-1}^* \\ &= \left(1-\alpha^*\right)\hat{K}_{t-1}^* + \left(1-\phi^*\right)\left(K_t^* - K_{t-1}^*\right) + \left(1-\phi^*\right)\delta K_{t-1}^* \\ &= \left(1-\alpha^*\right)\hat{K}_{t-1}^* + \left(1-\phi^*\right)K_t^* - \left(1-\phi^*\right)\left(1-\delta^*\right)K_{t-1}^* \end{aligned} \tag{4.7}$$

Substituting (4.6) into (4.5) yields

$$\begin{aligned} D_t = {} & f\left(K_t^*\right) - C_t^* - \left(K_t^* - K_{t-1}^*\right) - \left(1-\phi^*\right)\delta^* K_{t-1}^* + \left(B_t^* - B_{t-1}^*\right) - iB_{t-1}^* - \\ & \left\{\tau^*\left[f\left(K_t^*\right) - C_t^* - \alpha^* \hat{K}_t^*\right] - \left(\tau^{k^*} - \phi^*\right)K_t^* - \phi^* K_{t-1}^*\right\} \\ = {} & \left(1-\tau^*\right)\left[f\left(K_t^*\right) - C_t^* - iB_{t-1}^*\right] + \left(B_t^* - B_{t-1}^*\right) + \tau^* \alpha^* \hat{K}_t^* - \\ & \left[1 - \phi^* + \tau^{k^*}\right]K_t^* + \left(1-\phi^*\right)\left(1-\delta^*\right)K_{t-1}^* \end{aligned} \tag{4.8}$$

The flow of funds from the foreign subsidiary to the parent, net of all taxes, can be denoted as

$$\Psi_t = \left(1 - w^d\right)D_t^* + \left(1 - w^c\right)C_t^* \tag{4.9}$$

The grossed-up dividend is equal to

$$D_t^{*g} = D_t^* + \left(\frac{T_t^*}{\Pi_t^* - T_t^*}\right)D_t^* = \left(\frac{\Pi_t^*}{\Pi_t^* - T_t^*}\right)D_t^* > D_t^* \tag{4.10}$$

since $T_t^* > 0$, where $\Pi_t^* = f\left(K_t^*\right) - C_t^* - iB_{t-1}^* - \alpha^* \hat{K}_t^*$.

Assuming that the home and host countries use the same specification for gross profits of the foreign subsidiary, (4.10) reduces to

$$\begin{aligned} D_t^{*g} &= \left(\frac{\Pi_t^*}{\Pi_t^* - T_t^*} \right) D_t^* \\ &= \left(\frac{\Pi_t^*}{\Pi_t^* - \tau^* \Pi_t^*} \right) D_t^* \\ &= \left(\frac{1}{1 - \tau^*} \right) D_t^* \end{aligned} \tag{4.11}$$

The foreign tax credit is equal to

$$\begin{aligned} FTC_t^{D_t^*} &= \left(\frac{T_t^*}{\Pi_t^* - T_t^*} \right) D_t^* + w^d D_t^* \\ &= \left(\frac{\tau^*}{1 - \tau^*} \right) D_t^* + w^d D_t^* \end{aligned} \tag{4.12}$$

From (4.11) and (4.12), we can define the home country tax liability on repatriated dividends as

$$\begin{aligned} T_t^{D_t^*} &= \tau D_t^{*g} - FTC_t^{D_t^*} \\ &= \left(\frac{\tau}{1 - \tau^*} \right) D_t^* - \left(\frac{\tau^*}{1 - \tau^*} \right) D_t^* - w^d D_t^* \\ &= \left[\frac{\tau - \tau^* - (1 - \tau^*) w^d}{1 - \tau^*} \right] D_t^* \end{aligned} \tag{4.13}$$

Since surplus foreign tax credits are non-refundable, it must be the case that $T_t^{D_t^*} \geq 0$. Imposing this condition on (4.13), we find that the following must hold

$$\tau \geq \tau^* + (1 - \tau^*) w^d \tag{4.14}$$

To incorporate the condition that $T_t^{D_t^*} \geq 0$, we introduce a dummy variable, μ, such that

$$\mu = \begin{cases} 0 & \text{if excess foreign tax credits exist} \\ 1 & \text{otherwise} \end{cases} \tag{4.15}$$

Using this dummy variable, we redefine (4.13) as

$$T_t^{D_t^*} = \mu\left[\frac{\tau - \tau^* - (1-\tau^*)w^d}{1-\tau^*}\right]D_t^* \tag{4.16}$$

so that

$$T_t^{D_t^*}\Big|_{\mu=0} = 0 \text{ implying } \tau < \tau^* + (1-\tau^*)w^d$$

and

$$T_t^{D_t^*}\Big|_{\mu=1} = \left[\frac{\tau - \tau^* - (1-\tau^*)w^d}{1-\tau^*}\right]D_t^* \text{ implying } \tau \geq \tau^* + (1-\tau^*)w^d.$$

The home-country tax liability on cross-border charges is equal to

$$\begin{aligned} T_t^{C_t^*} &= \tau C_t^* - FTC_t^{C_t^*} \\ &= \tau C_t^* - w^c C_t^* \\ &= (\tau - w^c)C_t^* \end{aligned} \tag{4.17}$$

Combining (4.16) and (4.17), we know that the total home tax liability for the parent for repatriated and shifted income is

$$\begin{aligned} T_t &= T_t^{D_t^*} + T_t^{C_t^*} \\ &= \mu\left[\frac{\tau - \tau^* - (1-\tau^*)w^d}{1-\tau^*}\right]D_t^* + (\tau - w^c)C_t^* \end{aligned} \tag{4.18}$$

Utilising (4.9) and (4.18), the net-of-tax cash flow received by the parent from the foreign subsidiary in time t is

$$\begin{aligned}\overline{\Psi}_t &= \left(1-w^d\right)D_t^* + \left(1-w^c\right)C_t^* - T_t \\ &= \left(1-w^d\right)D_t^* - \mu\left[\frac{\tau-\tau^*-\left(1-\tau^*\right)w^d}{\left(1-\tau^*\right)}\right]D_t^* + \left(1-w^c\right)C_t^* - \left(\tau-w^c\right)C_t^* \\ &= \left\{\left(1-w^d\right) - \mu\left[\frac{\tau-\tau^*-\left(1-\tau^*\right)w^d}{\left(1-\tau^*\right)}\right]\right\}D_t^* + \left[1-w^c-\tau+w^c\right]C_t^* \\ &= \left\{1-\frac{\mu\left(\tau-\tau^*\right)+\left(1-\mu\right)\left(1-\tau^*\right)w^d}{\left(1-\tau^*\right)}\right\}D_t^* + \left(1-\tau\right)C_t^* \\ &= \left(1-\sigma^*\right)D_t^* + \left(1-\tau\right)C_t^*\end{aligned} \tag{4.19}$$

where

$$\sigma^* = \frac{\mu\left(\tau-\tau^*\right)+\left(1-\mu\right)\left(1-\tau^*\right)w^d}{1-\tau^*} \tag{4.20}$$

In the surplus foreign tax credit position $\sigma^*\big|_{\mu=0} = w^d$ and in the deficit foreign tax credit position, $\sigma^*\big|_{\mu=1} = \left(\tau-\tau^*\right)/\left(1-\tau^*\right)$.

The present value of the income accruing to the parent is equal to the net-of-tax cash flow, discounted by the discount rate of the parent, ρ (the opportunity cost of equity financing) such that

$$V_t = \sum_{t=0}^{\infty}\left(\frac{1}{1+\rho}\right)^t \overline{\Psi}_t \tag{4.21}$$

Solutions to the model

$$\max_{\left\{K_t^*,\hat{K}_t^*,B_t^*,C_t^*\right\}} \quad V_t = \sum_{t=0}^{\infty}\left(\frac{1}{1+\rho}\right)^t \overline{\Psi}_t \tag{4.22}$$

subject to

$$\hat{K}_t^* \geq \left(1-\alpha^*\right)\hat{K}_{t-1}^* + \left(1-\phi^*\right)K_t^* - \left(1-\phi^*\right)\left(1-\delta^*\right)K_{t-1}^* \tag{4.23}$$

$$D_t^* \geq 0 \tag{4.24}$$

$$\gamma^{*}K_{t}^{*} \geq B_{t}^{*} \tag{4.25}$$

$$\beta^{*} f\left(K_{t}^{*}\right)-C_{t}^{*} \geq 0 \tag{4.26}$$

$$B_{t}^{*} \geq 0 \tag{4.27}$$

and the Lagrange multipliers are λ_t^1 through λ_t^5 for equations (4.23) through (4.27) respectively.

Assume an interior solution for dividends and debt since this is the issue we wish to examine. These assumptions imply that $D_t^* > 0$ and $B_t^* > 0$. From the Kuhn-Tucker conditions, we know that $\lambda_t^2 = 0$ and $\lambda_t^5 = 0$ must hold. We impose these conditions immediately to simplify the remaining first-order conditions. The Lagrangian corresponding to (4.22) through (4.27), using the above-noted interior solution conditions is:

$$\begin{aligned} \underset{K_t^*,\hat{K}_t^*,B_t^*,C_t^*}{L} = \sum_{t=0}^{\infty}\left(\frac{1}{1+\rho}\right)^{t} \Big\{ & \left(1-\sigma^{*}\right)\Big[\left(1-\tau^{*}\right)\left(f\left(K_{t}^{*}\right)-C_{t}^{*}-iB_{t-1}^{*}\right)+\tau^{*}\alpha^{*}\hat{K}_{t}^{*}- \\ & \left(1-\phi^{*}+\tau^{k^{*}}\right)K_{t}^{*}+\left(1+\phi^{*}-\delta^{*}\right)K_{t-1}^{*}+B_{t}^{*}-B_{t-1}^{*}\Big]+\left(1-\tau\right)C_{t}^{*}+ \\ & \lambda_{t}^{1}\left[\left(1-\alpha^{*}\right)\hat{K}_{t-1}^{*}+\left(1-\phi^{*}\right)K_{t}^{*}-\left(1-\phi^{*}\right)\left(1-\delta^{*}\right)K_{t-1}^{*}-\hat{K}_{t}^{*}\right]+ \\ & \lambda_{t}^{3}\left[\gamma^{*}K_{t}^{*}-B_{t}^{*}\right]+\lambda_{t}^{4}\left[\beta^{*}f\left(K_{t}^{*}\right)-C_{t}^{*}\right]\Big\} \end{aligned} \tag{4.28}$$

The first-order conditions are

$$\frac{\partial L}{\partial \hat{K}_{t}^{*}}=\left(1-\sigma^{*}\right)\tau^{*}\alpha^{*}-\lambda_{t}^{1}+\left(\frac{1}{1+\rho}\right)\left(1-\alpha^{*}\right)\lambda_{t+1}^{1}=0 \tag{4.29}$$

$$\frac{\partial L}{\partial B_{t}^{*}}=\left(1-\sigma^{*}\right)-\lambda_{t}^{3}-\left(\frac{1}{1+\rho}\right)\left(1-\sigma^{*}\right)\left[i\left(1-\tau^{*}\right)+1\right]=0 \tag{4.30}$$

$$\frac{\partial L}{\partial C_{t}^{*}}=-\left(1-\sigma^{*}\right)\left(1-\tau^{*}\right)+\left(1-\tau\right)-\lambda_{t}^{4}=0 \tag{4.31}$$

$$\begin{aligned}\frac{\partial L}{\partial K_t^*} = {} & (1-\sigma^*)(1-\tau^*)f'(K_t^*) - (1-\sigma^*)(1-\phi^* + \tau^{k^*}) + \\ & (1-\phi^*)\lambda_t^1 + \gamma^*\lambda_t^3 + \beta^* f'(K_t^*)\lambda_t^4 + \\ & \left(\frac{1}{1+\rho}\right)\left[(1-\sigma^*)(1-\phi^*)(1-\delta^*) - (1-\phi^*)(1-\delta^*)\lambda_{t+1}^1\right] = 0\end{aligned} \tag{4.32}$$

along with the following Kuhn-Tucker conditions:

$\lambda_t^1 \geq 0$, $(1-\alpha^*)\hat{K}_{t-1}^* + (1-\phi^*)K_t^* - (1-\phi^*)(1-\delta^*)K_{t-1}^* - \hat{K}_t^* \geq 0$, and

$$\lambda_t^1\left[(1-\alpha^*)\hat{K}_{t-1}^* + (1-\phi^*)K_t^* - (1-\phi^*)(1-\delta^*)K_{t-1}^* - \hat{K}_t^*\right] = 0 \tag{4.33}$$

$$\lambda_t^2 \geq 0,\ D_t^* \geq 0, \text{ and } \lambda_t^2 D_t^* = 0 \tag{4.34}$$

$$\lambda_t^3 \geq 0,\ \gamma^* K_t^* - B_t^* \geq 0, \text{ and } \lambda_t^3(\gamma^* K_t^* - B_t^*) = 0 \tag{4.35}$$

$$\lambda_t^4 \geq 0,\ \beta^* f(K_t^*) - C_t^* \geq 0, \text{ and } \lambda_t^4\left[\beta^* f(K_t^*) - C_t^*\right] = 0 \tag{4.36}$$

$$\lambda_t^5 \geq 0,\ B_t^* \geq 0, \text{ and } \lambda_t^5 B_t^* = 0 \tag{4.37}$$

where $\hat{K}_t^*$ is defined by (4.23) and D_t^* is defined by (4.8).

From (4.31), we know that

$$\begin{aligned}\lambda_t^4 &= (1-\tau) - (1-\sigma^*)(1-\tau^*) \\ &= 1 - \tau - (1-\tau^*) + (1-\tau^*)\sigma^* \\ &= (\tau^* - \tau) + (1-\tau^*)\sigma^*\end{aligned} \tag{4.38}$$

In the surplus credit case, $\sigma^* = w^d$ so

$$\lambda_t^4 = (\tau^* - \tau) + (1-\tau^*)w^d \tag{4.39}$$

In the deficit foreign tax credit case,

$$\begin{aligned}\lambda_t^4 &= (\tau^* - \tau) + (1 - \tau^*)\sigma^* \\ &= \tau^* - \tau + (1 - \tau^*)\left(\frac{\tau - \tau^*}{1 - \tau^*}\right). \\ &= \tau^* - \tau + \tau - \tau^* \\ &= 0\end{aligned}$$

From (4.30) we find that

$$\begin{aligned}\lambda_t^3 &= (1 - \sigma^*) - \frac{1}{(1+\rho)}(1 - \sigma^*)[i(1 - \tau^*) + 1] \\ &= (1 - \sigma^*)\left\{1 - \frac{1}{(1+\rho)}[i(1 - \tau^*) + 1]\right\} \\ &= (1 - \sigma^*)\left\{\frac{1 + \rho - i(1 - \tau^*) - 1}{(1+\rho)}\right\} \\ &= \left(\frac{1 - \sigma^*}{1 + \rho}\right)[\rho - i(1 - \tau^*)]\end{aligned} \tag{4.40}$$

From (4.29) we find

$$\lambda_t^1 - \left(\frac{1}{1+\rho}\right)(1 - \alpha^*)\lambda_{t+1}^1 = (1 - \sigma^*)\tau^*\alpha^*$$

Let $\lambda^1 = \lambda_t^1 = \lambda_{t+1}^1$ so that

$$\begin{aligned}\lambda^1 - \left(\frac{1}{1+\rho}\right)(1 - \alpha^*)\lambda^1 &= (1 - \sigma^*)\tau^*\alpha^* \\ \frac{(1+\rho)\lambda^1 - (1 - \alpha^*)\lambda^1}{(1+\rho)} &= (1 - \sigma^*)\tau^*\alpha^* \\ (\rho + \alpha^*)\lambda^1 &= (1+\rho)(1 - \sigma^*)\tau^*\alpha^* \\ \lambda^1 &= \frac{(1 - \sigma^*)(1+\rho)\tau^*\alpha^*}{\rho + \alpha^*}\end{aligned} \tag{4.41}$$

Equations (4.42) through (4.44) deal with propositions 1 and 2. Refer to text.

Substituting (4.38), (4.40), and (4.41) into (4.32) we get:

$$0=(1-\sigma^{*})(1-\tau^{*})f'(K_t^{*})-(1-\sigma^{*})(1-\phi^{*}+\tau^{k^{*}})+(1-\phi^{*})\lambda^{1}+\gamma^{*}\lambda_t^{3}+$$
$$\beta^{*}f'(K_t^{*})\lambda_t^{4}+\left(\frac{1}{1+\rho}\right)\left[(1+\sigma^{*})(1-\phi^{*})(1-\delta^{*})-(1-\phi^{*})(1-\delta^{*})\lambda^{1}\right]$$

Rearranging this equation, we get

$$\left[(1-\sigma^{*})(1-\tau^{*})+\beta^{*}\lambda_t^{4}\right]f'(K_t^{*})=(1-\sigma^{*})(1-\phi^{*}+\tau^{k^{*}})-(1-\phi^{*})\lambda^{1}-\gamma^{*}\lambda_t^{3}-$$
$$\left(\frac{1}{1+\rho}\right)(1-\phi^{*})(1-\delta^{*})\left[(1+\sigma^{*})-\lambda^{1}\right]$$

Focusing on the left-hand side, we find that

$$\begin{aligned}LHS&=\left\{(1-\sigma^{*})(1-\tau^{*})+\beta^{*}\left[(\tau^{*}-\tau)+(1-\tau^{*})\sigma^{*}\right]\right\}f'(K_t^{*})\\&=\left\{(1-\sigma^{*})(1-\tau^{*})-\beta^{*}\left[(\tau-\tau^{*})-(1-\tau^{*})\sigma^{*}\right]\right\}f'(K_t^{*})\end{aligned}$$

Focusing on the right-hand side, we find that

$$\begin{aligned}RHS&=(1-\sigma^{*})(1-\phi^{*}+\tau^{k^{*}})-(1-\phi^{*})\lambda^{1}-\gamma^{*}\lambda_t^{3}-\left(\frac{1}{1+\rho}\right)(1-\phi^{*})(1-\delta^{*})\left[(1+\sigma^{*})-\lambda^{1}\right]\\&=(1-\sigma^{*})(1-\phi^{*}+\tau^{k^{*}})-\gamma^{*}\frac{(1-\sigma^{*})}{(1+\rho)}\left[\rho-i(1-\tau^{*})\right]-\frac{(1+\sigma^{*})(1-\phi^{*})(1-\delta^{*})}{(1+\rho)}-\\&\quad\tau^{*}\alpha^{*}\frac{(1-\sigma^{*})(1-\phi^{*})}{(\rho+\alpha^{*})}(\rho-\delta^{*})\\&=(1-\sigma^{*})\left\{(1-\phi^{*}+\tau^{k^{*}})-\frac{\gamma^{*}}{(1+\rho)}\left[\rho-i(1-\tau^{*})\right]-\frac{(1-\phi^{*})(1-\delta^{*})}{(1+\rho)}-\right.\\&\quad\left.\frac{\tau^{*}\alpha^{*}(1-\phi^{*})}{(\rho+\alpha^{*})}(\rho-\delta^{*})\right\}\end{aligned}$$

Combining the LHS and RHS, we get

$$f'(K_t^{*})=\left\{\frac{(1-\sigma^{*})}{(1-\sigma^{*})(1-\tau^{*})-\beta^{*}\left[\tau-\tau^{*}-(1-\tau^{*})\sigma^{*}\right]}\right\}\cdot(1-A)\qquad(4.45)$$

where $(1-A)$ is defined as

$$
(1-A)=\left(1-\phi^{*}+\tau^{k^{*}}\right)-\frac{\gamma^{*}}{(1+\rho)}\left[\rho-i\left(1-\tau^{*}\right)\right]-\frac{\left(1-\phi^{*}\right)\left(1-\delta^{*}\right)}{(1+\rho)}-
$$

$$
\frac{\tau^{*}\alpha^{*}\left(1-\phi^{*}\right)}{\left(\rho+\alpha^{*}\right)}\left(\rho+\delta^{*}\right) \tag{4.46}
$$

Let us define UCC^E as the user cost of capital in the surplus foreign tax credit position such that

$$
UCC^{E}=f'\left(K_{i}^{*}\right)\Big|_{\mu=0}=\left\{\frac{\left(1-w^{d}\right)}{\left(1-w^{d}\right)\left(1-\tau^{*}\right)-\beta^{*}\left[\tau-\tau^{*}-\left(1-\tau^{*}\right)w^{d}\right]}\right\}(1-A) \tag{4.47}
$$

Further, let UCC^D be the user cost of capital for the deficit foreign tax credit case such that

$$
UCC^{D}=f'\left(K_{i}^{*}\right)\Big|_{\mu=1}=\left(\frac{1}{1-\tau^{*}}\right)(1-A) \tag{4.48}
$$

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$$
\frac{\partial UCC^{E}}{\partial\beta^{*}}=\left[\tau-\tau^{*}-\left(1-\tau^{*}\right)w^{d}\right]\left(1-w^{d}\right)\frac{(1-A)}{G^{2}}<0 \tag{4.49}
$$

where

$$
G=\left(1-w^{d}\right)\left(1-\tau^{*}\right)-\beta^{*}\left[\tau-\tau^{*}-\left(1-\tau^{*}\right)w^{d}\right] \tag{4.50}
$$

$$
\begin{aligned}
\frac{\partial UCC^{E}}{\partial\tau^{*}}&=\frac{\left(1-w^{d}\right)\left(1-\beta^{*}\right)\left(1-w^{d}\right)(1-A)}{G^{2}}-\\
&\quad\frac{\left(1-w^{d}\right)}{G}\left\{\frac{\gamma^{*}i}{(1+\rho)}+\frac{\alpha^{*}\left(1+\phi^{*}\right)}{\left(\rho+\alpha^{*}\right)}\left(\rho+\delta^{*}\right)\right\}\\
&=\frac{\left(1-w^{d}\right)}{G}\left\{\left(1-\beta^{*}\right)UCC^{E}-\frac{\gamma^{*}i}{(1+\rho)}-\right.\\
&\quad\left.\frac{\delta^{*}\alpha^{*}\left(1+\phi^{*}\right)}{\left(\rho+\alpha^{*}\right)}\left(\rho+\delta^{*}\right)\right\}
\end{aligned} \tag{4.51}
$$

$$\begin{aligned}\frac{\partial UCC^E}{\partial \tau} &= \frac{\beta^*\left(1-w^d\right)\left(1-A\right)}{G^2} \\ &= \beta^* \frac{1}{G} UCC^E\end{aligned} \tag{4.52}$$

$$\begin{aligned}\frac{\partial UCC^D}{\partial \tau^*} &= \frac{1}{\left(1-\tau^*\right)^2}\left(1-A\right) - \frac{1}{\left(1-\tau^*\right)}\left\{\frac{\gamma^* i}{\left(1+\rho\right)} + \frac{\alpha^*\left(1-\phi^*\right)}{\left(\rho+\alpha^*\right)}\left(\rho+\delta^*\right)\right\} \\ &= \frac{1}{\left(1-\tau^*\right)} UCC^D - \frac{1}{\left(1-\tau^*\right)}\left\{\frac{\gamma^* i}{\left(1+\rho\right)} + \frac{\alpha^*\left(1-\phi^*\right)}{\left(\rho+\alpha^*\right)}\left(\rho+\delta^*\right)\right\} \\ &= \frac{1}{\left(1-\tau^*\right)}\left\{UCC^D - \frac{\gamma^* i}{\left(1+\rho\right)} - \frac{\alpha^*\left(1-\phi^*\right)}{\left(\rho+\alpha^*\right)}\left(\rho+\delta^*\right)\right\}\end{aligned} \tag{4.53}$$

$$\frac{\partial UCC^D}{\partial \tau} = 0 \tag{4.54}$$

APPENDIX 2
GMM ESTIMATION METHODOLOGY

A brief explanation of the GMM methodology is as follows. Let

$$\mathbf{Y} = \mathbf{X}\beta + \varepsilon \tag{A2.1}$$

be a single equation model where **Y** is an N x 1 vector of observations on the dependent variable, **X** is the N x k matrix of right-hand side variables, β is a k x 1 vector of unknown parameters, and ε is a vector of random errors.

Let **Z** be an N x K vector of instrumental variables. The estimated parameters, β, are found by minimising the objective function

$$\varepsilon'\mathbf{Z}(\mathbf{Z}'\Omega\mathbf{Z})^{-1}\mathbf{Z}'\varepsilon \tag{A2.2}$$

where $\varepsilon = \mathbf{Y} - \mathbf{X}\beta$. With the estimated coefficients, $\hat{\beta}$, the estimated GMM residuals are $\hat{\varepsilon} = \mathbf{Y} - \mathbf{X}\hat{\beta}$. In the single linear equation model, the estimated coefficients $\hat{\beta}$ and the covariance matrix are defined as

$$\hat{\beta} = \left(\mathbf{X}'\mathbf{Z}\hat{\Omega}^{-1}\mathbf{Z}'\mathbf{X}\right)^{-1}\mathbf{X}'\mathbf{Z}\hat{\Omega}^{-1}\mathbf{Z}'\mathbf{Y} \tag{A2.3}$$

$$\hat{\sigma}^2\left(\mathbf{X}'\mathbf{Z}\left(\mathbf{Z}'\hat{\Omega}\mathbf{Z}\right)^{-1}\mathbf{Z}'\mathbf{X}\right)^{-1} \tag{A2.4}$$

where $\hat{\sigma}^2 = \hat{\varepsilon}'\hat{\varepsilon}/N$.

The matrix $\left(\mathbf{Z}'\hat{\Omega}\mathbf{Z}\right)$ is known as the weighting matrix. The covariance matrix, $\hat{\Omega}$, must be specified to ensure that it is heteroskedasticity and autocorrelation consistent.

APPENDIX 3
TAX CHANGES AND CROSS-BORDER CHARGES: AN ANALYSIS USING THE HOGG AND MINTZ (1993) DATA

In 1984, the United States made significant changes to corporate taxes while changes in Canada occurred in 1985. Hogg and Mintz (1993) examine the impact of Canadian and US tax reforms on the financing of US MNEs. They provide a detailed description of the tax changes over the period 1983 to 1989 and then hypothesise about the impact of these changes. Using a unique data set with information about twenty-eight Canadian corporations that are wholly-owned subsidiaries of US MNEs for the period 1983 to 1989, Hogg and Mintz (1993) then examine the empirical evidence to test their hypotheses.

In this appendix, we focus on taxation and cross-border charges to extend the analysis of Hogg and Mintz (1993) and to complement the empirical analysis done in chapter 5. Specifically, we focus on the behaviour of taxation and cross-border charges and use the Hogg and Mintz (1993) data to estimate a slightly revised version of the model in chapter 5. We find that there is some support for MNEs adjusting their cross-border charges in response to tax changes. However, the response is only to delay charges from one year to the next when it is known that the tax rate in the home country is going to be lower in the next year. The effect of the tax rate on cross-border charges is not consistent with expectations as the model suggests that more income is shifted from Canada to the United States when the tax rate in the United States is higher and less income is shifted when the US tax rate is lower. While inconsistent the expected direction of the income flows, the result is consistent with our findings in chapter 5.

This appendix is organised as follows. In sections A3-1 and A3-2, we summarise the tax changes in Canada and the United States that occurred between 1983 and 1989. In the Hogg and Mintz (1993) study, the authors suggest how of local debt financing, dividend repatriation, and cross-border charges should change as a result of the tax changes. These observations are summarised in section A3-3. In sections A3-4 and A3-5 we briefly describe the data used in the Hogg and Mintz (1993) analysis along with the empirical findings.

In section A3-6, we describe the model that we use to examine the issue of income shifting through cross-border charges. This model is a variant of the one used in chapter 5. We provide some descriptive statistics in section A3-7 before turning to our empirical findings in section A3-8. Finally, we summarise our results in section A3-9.

A3-1 Canadian tax changes from 1983 to 1989

Table A3-1 provides a summary of the federal and provincial/state corporate tax rates in Canada and the US from 1984 through 1989. Before the tax reforms were undertaken, Canadian corporate tax rates were lower than in the United States. Further, withholding taxes paid on dividends were creditable against US tax liabilities. Since the US tax rate exceeded the Canadian tax rate, the US parent would be able to credit fully the withholding taxes against the US tax liability. Hogg and Mintz (1993) note that the Canadian and US governments paid little attention to cross-border charges such as transfer prices, royalties, and management and administration fees. However, the Canadian government did examine the provisions regarding the deductibility of costs and expenses that may otherwise relate to the business of the subsidiary. In addition to changes in the statutory tax rates, a number of other changes were initiated (*e.g.*, broadening the tax base) by the Canadian government resulting in an increase in the average rate of corporate tax.

Between 1985 and 1989, the capital cost allowance rates on specific categories of assets were reduced. Corporate surtaxes have been used in Canada to temporarily adjust the statutory tax rate as it applies to specific tax payers. In 1983, the surtax was

2.5 percent of the tax otherwise payable. In 1984, the rate was 5 percent and it was eliminated for 1985 and 1986. In 1986, the rate was set at 3 percent.

Since 1972, manufacturing corporations in Canada have received an incentive, in the form of reduced tax rates, to expand domestic production. Initially the reduction was 9 percent. In 1987 it was reduced to 7 percent and in 1988 it was further reduced to 5 percent.

To encourage capital investments, in the mid-1970s Canada adopted a system of investment tax credits. The rates vary by region but the typical rate during the period 1983 to 1989 was 7 percent. Prior to 1989 there were some limited exceptions whereby the rate was as high as 60 percent and in 1989 it was as high as 45 percent. While the complexities of the investment tax credits make it difficult to compare them over time, the fact remains that the rates of credit were declining from 1983 to 1989.

Canada permits the deduction of current expenditures on all scientific research and deductions of capital expenditures for scientific research when the expenditures are made in Canada. From 1983 to 1989, the determination of what qualified for these deductions was tightened. However, Hogg and Mintz (1993) note the US has a significantly more favourable tax treatment of these expenditures. Thus, the tax treatment of scientific research did not provide sufficient incentives for there to be a shift in the location of these expenditures.

During the period 1983 to 1989, more attention was paid to the administration procedures and assessing practices of tax collection. For example, Canada was more active in reviewing transfer pricing and other cross-border charges despite there being no statutory changes to the tax laws in this area.

A3-2 United States tax changes from 1983 to 1989

The US government undertook corporate tax reforms in both 1984 and 1986. Prior to 1984, a US MNE could determine its foreign tax credit by averaging high- and low-taxed income in one overall credit calculation as opposed to separate-country calculations. Interest income, which was otherwise subject to a different limitations for foreign tax credits, could be earned through a foreign corporation and, as such, used in the overall calculation of the foreign tax credit. In 1984, for the purposes of the foreign tax credit calculation, certain income was treated as US-based, regardless of where that income was earned. Also, foreign corporations were no longer able to be used to earn income that would otherwise be US-source income.

Before the 1986 changes, foreign tax credits for earnings and profits were determined on a year-by-year basis; foreign taxes paid were also allocated year by year. This allowed discretionary deductions to be used in years when the subsidiary had higher taxes. For example, instead of issuing equal amounts of dividends over two years, a Canadian subsidiary could pay a higher dividend (equal to the aggregate of what would have been paid over the two years) in a year when Canadian taxes are higher. This aggregate dividend will result in a higher foreign tax credit for the US MNE. The 1986 tax changes eliminated any advantage of such tax planning. Other changes were made to the determination of foreign tax credits. For example, the 1986 tax reforms created a number of categories for foreign earnings and foreign tax credits on these categories were not all treated in the same manner.

Effective July 1987, the rates of corporate taxation were lowered. However, there were a number of changes which significantly expanded the tax base. The alternative minimum tax (AMT) was introduced. The accelerated cost recovery system was revised such that depreciation of assets were more closely matched with the economic or useful life of the assets. There were new limitations on net operating loss carry-overs and there were new rules on the measurement and timing of taxable income.

Non-statutory changes included paying closer attention to costs and expenses allocated to earnings of Canadian subsidiaries and repatriated to US parents through dividend remittances. Transfer pricing was also more stringently scrutinised.

A3-3 Hogg and Mintz (1993) predictions relating to the tax reforms

Given the tax reforms of the mid-1980s in Canada and the US, Hogg and Mintz (1993) formulate three predictions that they believe will occur as a result of the tax changes. These predictions relate to the behaviour of debt, cross-border charges, and dividends; they ignore the impact of the tax reforms on investment decisions. Table A3-2 summarises these predictions which are described in more detail below.

First, local debt financing of Canadian subsidiaries of US MNEs will be favoured over the US parent financing the debt. This preference will arise because the interest deductions will provide a greater tax benefit in Canada than in the United States. Also, the US reforms to the treatment of interest costs will encourage the debt to be issued by the Canadian subsidiary.

Second, cross-border charges should increase after the tax changes have been implemented. To take advantage of higher Canadian tax rates in 1987 to 1989, there is an incentive to take deductions in Canada for cross-border charges as the tax benefit will be larger. This is particularly true for items that are not subject to withholding taxes due to a tax treaty between Canada and the United States. Also, the lower US tax rates from 1987 to 1989 resulted in many US parents of MNEs switching from an deficit of foreign tax credits to a surplus. Reducing taxes paid in Canada will result in lower foreign tax credits. The lower foreign tax credits arising from dividends from the Canadian subsidiary may sufficiently reduce the surplus foreign tax credit position of the US parent which is more desirable from a tax-minimising standpoint.

Third, the tax reforms should reduce the incentive to reinvest earnings in Canada, resulting in higher dividend remittances to the US parent corporation. Hogg and Mintz (1993) note that it is generally accepted that there is an incentive for the subsidiary to delay payment of taxes by reinvesting earnings instead of paying taxes on repatriated income. However, there is no tax cost of paying dividends when the deficit tax credit position is equal to the withholding taxes payable on the dividends.

From a tax planning standpoint, the parent is indifferent between paying dividends and reinvesting earnings. Therefore, the tax cost of repatriation is minimised providing the parent corporation can average surplus credits on some income sources and deficit credits on others.

Prior to Canadian tax reforms, the taxes on dividend repatriations could be quite high. Hogg and Mintz (1993) note that the tax reforms reduced the difference between Canadian and US average tax rates, resulting in a reduced incentive to reinvest earnings in Canada. Dividend payouts would increase because US parents faced cash flow shortages due to increased leverage and dividend repatriation could reduce the need to raise funds in the United States. Also, the rules for interest deductions discouraged leverage in the United States, resulting in increased dividend repatriation in order to help pay down the debt of the US parent corporation.

A3-4 The data

The Hogg and Mintz (1993) data contains financial information on twenty-eight Canadian subsidiaries of US MNEs for the period 1983-1989. The data was obtained on a confidential basis from Arthur Anderson and contains detailed information on the Canadian subsidiaries. The subsidiaries are in the manufacturing and resource industries and range in size from $5 million to over $100 million in assets. While the sample is small, Hogg and Mintz (1993) suggest, but never provide support for the fact, that this data is roughly comparable to aggregate data for all Canadian subsidiaries of US MNEs.

The unique characteristic of the data is that it contains information that is not normally available in the public domain. In addition to the financial information that is normally available for a corporation through annual financial statements the Hogg and Mintz (1993) data also includes data such as cross-border charges and SRED expenditures. It also breaks down taxes paid into federal, provincial, and capital taxes payable. Typically this information is not readily available. The data set contains no information about the parent corporation; all that is known is that the data is for a wholly-owned Canadian subsidiary of a parent corporation.

Unfortunately, not all financial information is available for every year for each corporation in the sample. While the Hogg and Mintz (1993) analysis utilise all observations, our preference is to work with a balanced panel data set. A balanced panel data set allows us to apply the same empirical techniques to the data as were applied to the balanced panel set in chapter 5.[1] The balanced panel data set that we use consists of twelve corporations over the seven-year period 1983 to 1989.

A3-5 Empirical results of Hogg and Mintz (1993)

Empirically, the correlation coefficient between dividends and cross-border charges, both expressed as a proportion of net income is positive (0.53) and significant. Hogg and Mintz (1993) suggest that this indicates that companies that remit income to the US parent corporation view dividends and cross-border charges as complements and not substitutes, lending support to the hypothesis.

Hogg and Mintz (1993) also examine the behaviour of the subsidiaries in two sub-periods: 1983-1985, and 1987-1989. First, they calculated for each company the mean of the debt-asset ratio, the dividend payout ratio (computed as dividends divided by net income), the cross-border charges ratio (as a proportion of net income), the average tax rate, and the return on equity for both sub-periods. Next, Hogg and Mintz (1993) found the frequency distribution and tested if there was a significant change in the variables over the two sub-periods.

Hogg and Mintz (1993) found that the debt-asset ratio increased in the second period by 0.06 for about 70 percent of the subsidiaries and that the increase is statistically different from zero. They suggest this lends support to the hypothesis that the debt-asset ratio of US MNEs increased after 1986 when the statutory tax rates became higher in Canada and US interest allocation rules were modified. An alternative explanation is that during the first period, the economy was in a recession or recovering from the recession while in the second period, the economy was considerably stronger. It is possible that debt-financed investment increased in the second period due to the strength of the economy and not because the tax rate in the US was lower than the tax rate in Canada.

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[1] It is not necessary to work with a balanced data set as there are techniques that can be used to deal with unbalanced data sets. However, we choose to use the balanced panel so that the same techniques used in Chapter 5 can be used in this appendix.

According to the theory, cross-border charges should have increased after 1986 but in fact they were reduced in 25 percent of the subsidiaries and no statistical difference was found in the ratio in the two sub-periods. While this is inconsistent with the second hypothesis, Hogg and Mintz (1993) suggest that changes in the auditing practices of the Canadian government may have discouraged subsidiaries from using cross-border charges to shift income.

The dividend ratio payout increase by 0.72 and the change was statistically significant. Fifty-five percent of the subsidiaries increased their ratio, 25 percent continued to not repatriate income through dividends, while the remaining 20 percent reduced their ratio. This supports the third hypothesis that dividend repatriation will increase. Hogg and Mintz (1993) also find that the average tax rate and average profit rates had statistically significant increases of 0.09 and 0.07 respectively. However, Hogg and Mintz (1993) do not comment on the possibility that stronger economic conditions in the second period may contribute to a higher dividend payout ratio.

A3-6 Our model

Utilising the Hogg and Mintz (1993) data, we modify the model estimated in chapter 5 to examine the issue of income shifting. Recall that equation (5.4) is

$$\left(\frac{T^C}{A^C}\right)_{ft} = \alpha\left(\Delta\tau_t \mathbf{d}_{ft}\right) + \beta\mathbf{C}_{ft} + \varepsilon_{ft} \tag{5.4}$$

where T^C is the Canadian tax liability, A^C is total book value of Canadian assets, f and t are firm and time subscripts; $\Delta\tau_t$ is a vector of statutory tax differentials between foreign jurisdictions and Canada, $\tau^{USA} - \tau^{CANADA}$; $\mathbf{d}_{ft}$ is a vector of locational dummy variables for firm f in period t. Only wholly-owned Canadian subsidiaries of US MNEs are included in the Hogg and Mintz (1993) data. Therefore, the only locational dummy variable in $\mathbf{d}_{ft}$ is for the United States and it is always equal to one. Control variables, **C**, are also included; α and β are vectors of regression coefficients and ε_{ft} is a well-behaved error term. All financial data included in **C** are scaled by total assets, A^C. Since we only have data on the Canadian subsidiaries of US MNEs, α contains only one coefficient.

The hypothesis of income shifting involves testing if α is positive. This test presumes that having a subsidiary in a high-tax country induces the MNE to shift income to Canada, increasing taxable income and the Canadian tax liability while operating in a low-tax country induces a shift of income in the opposite direction and will lower the Canadian tax liability.

Since the Hogg and Mintz (1993) data contains information on cross-border charges, we modify the model described by (5.4) by using cross-border charges (scaled by total assets) as the dependent variable rather than the federal tax liability as was the case in the model in chapter 5. Cross-border charges are the preferred dependent variable since we are interested in specifically examining the effect of tax changes on the cross-border charges. Unlike our previous analysis, we can directly examine the effect of taxes on cross-border charges, rather than having to examine the effect of tax rates and country location on the tax liability and then inferring from our results the behaviour of the cross-border charges.

Our estimating equation becomes

$$\left(\frac{Z^C}{A^C}\right)_{ft} = \alpha\Delta\tau_t + \beta\mathbf{C}_{ft} + \varepsilon_{ft} \tag{A3.1}$$

where Z^C is cross-border charges, A^C is total book value of Canadian assets, *f* and *t* are firm and time subscripts; and $\Delta\tau_t$ is a vector of statutory tax differentials between the United States and Canada. Cross-border charges include interest payments, royalties (*e.g.*, for the use of trademarks, trade names, and patents), and other expenses such as management fees charged by the parent corporation (*e.g.*, for financial and accounting services, legal services, and general management services).

Control variables, **C**, are also included; α and β are vectors of regression. The control variables in this model are the capital consumption allowance (CCA), scientific research and experimental design (SRED) costs, investment tax credits, loss carry-forward use, debt, and dividends paid to the parent corporation. Due to the lack of availability, salary expenditures, interest expenses, and rental expenses cannot be included in this model. To compensate, we include the corporations taxable income in the model.

We also include some dummy variables in the estimation of equation (A3.1). In one estimation we eliminate the tax differential variable, $\Delta\tau_t$, and include a dummy variable that equals one for the post tax change years, 1987 through 1989. In another estimation, we include a dummy variable for they year 1986 and another dummy variable for the year 1987. In 1987, the US tax rate fell from 52% to 40%. More importantly, prior to 1987, the US tax rate was higher than the Canadian tax rate; in 1987 and afterwards, this relationship was reversed. Starting in 1987, we would expect to see cross-border charges flow from Canada to the United States. This effect should be reflected in the tax differential variable. However, tax changes do not occur suddenly. Both the Canadian and US tax changes of the mid-1980s took several years to finalise and implement. Furthermore, changes to the tax codes are announced in advance of the actual change.

With the advance notice about the tax changes, it is beneficial to engage in some degree of tax planning. Suppose a corporation knows that the tax rate in the United States will drop by 12 percent in 1987 and that the US rate will be lower than the Canadian rate after the change. It is advantageous to delay the payment of cross-border charges to the parent at the end of 1986 and pay them in 1987. The parent corporation's income can now be taxed in 1987 at a rate of forty percent rather than fifty-two percent that would have been paid in 1986.

To capture the possible timing of cross-border charges to take advantage of the ensuing tax changes, we use dummy variables for 1986 and 1987. We expect the 1986 dummy variable to be negative since payments would be postponed to 1987 when the tax rate is lower. The dummy variable for 1987 should be positive as cross-border charges should increase due to the timing of the payments. Further, it is not unreasonable for the magnitude of the coefficients on these two dummy variables to be equal in absolute value since any payments postponed in 1986 would be paid in 1987.

A3-7 Descriptive statistics

In Table A3-3 we provide the average and median for some key variables in the Hogg and Mintz (1993) data; we do not provide the maximum and minimum to ensure confidentiality of the corporations in the sample. However, the total assets of the corporations in our sample range from around \$5 million to over \$100 million.

The average dividend paid over the entire sample is \$2.4 million and \$2.1 million in cross-border charges. For 1989, five corporations issued dividends and six had cross-border charges. In the entire sample range, there are fifty-five positive observations for cross-border charges and there are twenty-seven positive observations for dividend payments. None of the corporations in our sample have loss carry-forwards in 1989, although there are thirteen observations in the entire sample that are non-zero.

The average total assets for 1989 are $72.8 million; total debt is $31.3 million. Only a few corporations have research and development expenditures during the sample period with an average expenditure of $0.4 million.

All corporations in the sample paid federal income taxes in at least one year of the sample and there are positive tax liabilities for 76% of the observations. The average Canadian federal taxes payable is $2.0 million and the weighed average federal tax rate is 24.8%; for 1983 and 1989, the weighted average tax rates are 26.9% and 29.5% respectively.[2] The maximum federal tax rate in the 1989 sample was 29.6% with the median equal to 26.4%.

A3-8 Estimation results

The estimating methodology is the same as the methodology followed in chapter 5. For further details, refer to section 5-6. We assume that there is potential endogeneity with the dividend and taxable income variables and we use the one-period lagged values as instruments.[3]

The results of the estimations are summarised in Table A3-4. The table includes the results for the three different estimations that were performed along with the expected sign for each variable. We expect the coefficient on the tax differential to be negative. If the US tax rate is higher than the Canadian tax rate, the tax differential, as defined in our model, is positive. Suppose the US tax rate decreases and becomes lower than the Canadian rate. The tax differential is now negative. The expected response is that cross-border charges should increase as there is a tax savings if more income is reported in the United States. If the tax differential is negative and cross-border charges should increase, then the coefficient on the tax differential should be negative.

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[2] The weighted average tax rate is calculated as the sum of the federal tax liability over the period divided by the sum of the taxable income over the same period. This method places more weight on corporations with large taxable incomes and less weight on those with lower taxable incomes. For example, if two corporations have taxable incomes of $1 million and $100 million and they have tax liabilities of nil and $25 million, their average tax rates are zero and 25%. The average of their tax rates is 12.5% whereas the weighted average is 24.8% ($25 million divided by $101 million).

[3] To test the null hypothesis of no endogeneity, we conducted a Hausman test. The test statistics for the three specifications were all well over the critical value of 3.84.

For CCA, SRED, investment tax credits, and loss carryforward use, the coefficients should be negative since higher deductions in these four categories will reduce taxable income and reduce the need to shift the income to the lower tax rate jurisdiction.

The sign of the debt coefficient is ambiguous. A higher level of debt would suggest higher interest expense payments that would in turn reduce the taxable income and reduce the need to shift income to the lower tax rate jurisdiction. However, if any of the Canadian subsidiary's debt is held by the US parent corporation, the higher interest payments associated with a higher level of debt results in higher cross-border charges since interest expenses are included in cross-border charges. Therefore, the debt coefficient can be either positive or negative.

The coefficient on the dividends paid to the parent should be negative since higher dividend payments suggests that fewer cross-border charges are necessary. Further, the dividend coefficient should equal negative one if dividends and cross-border charges are perfect substitutes.[4] However, differences in the tax treatment of cross-border charges and dividends will make the two imperfect substitutes and the coefficient is expected to be less than one. For taxable income, the coefficient should be positive since higher taxable income suggests a greater need to increase cross-border charges.

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[4] We note that Hogg and Mintz (1993) suggest that cross-border charges and dividends can be complements for tax planning reasons.

Three dummy variables are used in the various specifications. The dummy variable for the period 1987 to 1989 should be positive. The US tax rate is lower in this period suggesting that the cross-border charges should be higher to take advantage of the lower US tax rate. The other two dummy variables are for 1986 and 1987 respectively. In 1987, the US tax rate was reduced significantly such that the US rate was now lower than the Canadian rate. As with the dummy variable for the 1987 through 1989 period, we would expect the 1987 dummy variable alone to be positive for the same reason. For the 1986 dummy variable, the coefficient should be negative since income should be retained in Canada in 1986 because the Canadian tax rate is lower. Further, the 1987 tax changes were not unexpected. In fact, it took several years for both the Canadian and US governments to implement the tax changes that were being discussed.

If we assume that the corporations in our sample are not abusing the transfer prices and are in fact pricing their inter-company transactions at an arm's-length rate, the only ways to take advantage of the significant change in the tax differential in 1987 is to hold back transactions in 1986 and push them in to 1987. This would suggest that cross-border charges should be reduced from the steady-state level in 1986 and increased in 1987. Further, the coefficients on the two dummy variables should be equal in magnitude and opposite in sign. If this is true, the corporations are holding back making transactions at the end of 1986 and, instead, making the payments in 1987 when the US tax rate is lower and the global tax savings is higher than before. After 1987, there is little incentive to continue this timing-of-payments behaviour as the tax differentials are reduced because the Canadian tax rates were reduced in 1987, thus reducing the overall tax differential.

In specification 1, the tax differential is not included; instead, the dummy variable for the period 1987-1989 is used. The coefficient on the dummy variable is significant at the 5% level but the sign is inconsistent with our expectations. The dividend coefficient and the taxable income coefficients are significant and are consistent with our expectations. The leverage and SRED coefficients are significant and the signs are not inconsistent with expectations.

The coefficient on the dummy variable suggests that the cross-border chargers are lower in the period 1987 to 1989 than in the earlier period. This is inconsistent with our expectations. The tax rate in the United States is lower than the Canadian tax rate from 1987 to 1989. Therefore, more and not less income should be shifted to the United States in the latter period. Although the result does not support the income shifting hypothesis, it is consistent with the findings in chapter 5. Recall from chapter 5 that the coefficient on the US locational dummy variable was significantly positive, and also suggested income flowed in the direction that does not support the income shifting hypothesis.

In specification 2, we drop the dummy variable for the period 1987 to 1989 and now use the tax differential. The results from this specification are not much different from the results from specification 1. The signs of all the control variables are the same and again, the CCA is the only insignificant control variable. The tax differential coefficient is insignificant in this specification. This result does not support the income shifting hypothesis since the result is suggesting that the tax differential has no significant impact on the level of cross-border charges.

In the final specification, we add dummy variables for 1986 and 1987 to specification 2. As noted earlier, these dummy variables are intended to capture the timing-of-payments behaviour that may exist due to the advance knowledge of the tax changes. In this specification, the control variables are similar in value and significance when compared to the first two specifications. However, the tax differential is now significant, but the positive sign is inconsistent with the income shifting hypothesis.

This result for the tax differential is problematic since it suggests the income flows are opposite to what we expect them to be given the tax differentials facing the corporations in our sample. As with the first specification, the inconsistent result with respect to the direction of the income shifting is at least consistent with the findings from the empirical model estimated in chapter 5.

The coefficients on the dummy variables in specification 3 are both significant and have the anticipated signs, although the coefficient for the 1986 dummy variable is only significant at the 10% level. The coefficient for the 1986 dummy variable suggests that corporations in the sample reduced the level of cross-border charges in 1986, knowing that the tax rates in the United States would be lowered in 1987 and would be lower than the Canadian rates. In 1987, the dummy variable coefficient suggests that the corresponding cross-border charge response after the tax changes was to increase the charges, again taking advantage of the lower US tax rates. We tested the two dummy variable coefficients to see if the response in each year was symmetrical—did the corporation reduce cross-border charges in 1986 by the same amount by which they increased the cross-border charges in 1987? The test statistic for this hypothesis is 0.026 which is well below the critical value, suggesting the response is symmetrical.

A3-9 Summary

In this appendix, we examine the role of tax rates and changes to these tax rates on the level of cross-border charges between a Canadian subsidiary and its US parent corporation. We find that there is some support for MNE's adjusting their cross-border charges in response to tax changes. However, the response is only to delay charges from one year to the next when it is known that the tax rate in the home country is going to be lower in the next year. The effect of the tax rate on cross-border charges is not consistent with expectations as the econometric results suggest that more income is shifted from Canada to the United States when the tax rate in the United States is higher and less income is shifted when the tax rate is lower.

Recall that Hogg and Mintz (1993) are unable to find support for the prediction that cross-border charges should increase in the post-1986 period and, in fact, find that income flows in an unexpected direction. While our results are also inconsistent the expected direction of the income flows, they are consistent with the Hogg and Mintz (1993) findings.

Further, recall from chapter 5 that the econometric results were unable to support the income shifting hypothesis with respect to income flows between Canada and the United States. Our findings in this appendix further support the results in chapter 5.

A3-10 References

Corporate Taxes: A Worldwide Summary. (various years). New York: Price Waterhouse.

Hogg, Roy D. and Jack M. Mintz (1993). "Impacts of Canadian and U.S. Tax Reform on the Financing of Canadian Subsidiaries of U.S. Parents." in *Studies in International Taxation.* by Giovannini, Alberto, R. Glenn Hubbard, and Joel Slemrod (eds.). Chicago: The University of Chicago Press. pp. 47-76.

Table A3-1 **Canadian manufacturing tax rate and US tax rate**
Includes both federal and provincial/state tax rates.

Year	τ_c	τ_{us}	$\Delta\tau = \tau_{us} - \tau_c$
1983	44.8	53.5	+8.7
1984	44.8	53.5	+8.7
1985	44.8	52.0	+7.2
1986	45.5	52.0	+6.5
1987	45.5	40.0	-5.5
1988	41.8	40.0	-1.8
1989	40.3	40.0	-0.3

The provincial/state tax rate is assumed to be the "typical" or "average" tax rate as determined in *Corporate Taxes: A Worldwide Summary*. (various years). New York: Price Waterhouse.

Table A3-2 **Summary of Hogg and Mintz (1993) predictions**

	Prediction	Empirical Results
Local debt financing	Debt financing in Canada should increase. This preference will arise because the interest deductions will provide a greater tax benefit in Canada than in the United States.	Find support for prediction.
Cross-border charges	Cross-border charges should increase because of the tax advantage resulting from the higher Canadian tax rates and lower US tax rates.	Do not find support for prediction; empirical analysis suggests income flows in an unexpected direction.
Dividends	Dividend payouts would increase. Since the Canadian tax rate exceeded the US tax rate after the 1986 tax changes, the parent corporation will be in an excess foreign tax credit position. The only cost of dividend repatriations are the additional withholding taxes that the Canadian government will charge.	Find support for the prediction.

Source: Author's summary.

Table A3-3 Descriptive statistics for Mintz and Hogg (1993) data
($,000)

Variable	1983 Average	1989 Average	Average	Median
Net income before taxes	$3,215	$19,268	$10,421	$2,180
Dividends paid to parent	239	7,141	2,435	0
Total assets	54,845	113,138	72,682	19,365
Shareholder's equity	28,787	59,096	40,480	13,997
Total debt	25,662	53,888	31,265	10,000
Canadian taxable income	2,202	10,900	8,117	1,266
Capital consumption allowance	1,111	1,837	1,894	404
SRED (only those with expenditures)	301	765	403	240
Loss carryforward use	522	0	586	0
Cross-border charges	1,622	3,493	2,121	190
Investment tax credits	26,647	176	4,154	0
Federal tax payable	592	3,215	2,016	381
Average federal tax rate	26.9%	24.8%	29.5%	27.2%

Source: Author's calculations.

Table A3-4 Estimation results with Hogg and Mintz (1993) data

		Specification 1	Specification 2	Specification 3
Variable	**Expected Sign**	**Coefficient (t-ratio)**	**Coefficient (t-ratio)**	**Coefficient (t-ratio)**
$\Delta\tau$	Negative		0.000557 (0.875)	0.00327^{a} (4.101)
CCA	Negative	0.10138 (1.049)	0.091388 (0.959)	0.11365 (1.149)
SR&ED	Negative	-5.61060^{a1} (-4.069)	-5.563600^{a1} (-4.079)	-5.4993^{a1} (-3.947)
Investment Tax Credit	Negative	2.41840^{a} (4.343)	2.638400^{a} (4.635)	2.24110^{a} (3.970)
Loss Carryforward Use	Negative	0.40970^{a} (3.315)	0.412870^{a} (3.346)	0.45633^{a} (3.606)
Leverage	Negative or Positive	0.18416^{a} (8.212)	0.186250^{a} (8.228)	0.18136^{a} (8.082)
Dividends paid to parent	Negative	-0.87273^{a1} (-6.563)	-0.908990^{a1} (-6.660)	-0.80895^{a1} (-5.961)
Taxable income	Positive	0.63018^{a1} (7.356)	0.620020^{a1} (7.389)	0.65352^{a1} (7.654)
Dummy variable for 1987-1989	Positive	-0.01396^{b} (-2.119)		
Dummy variable for 1986	Negative			-0.00954^{c1} (-1.373)
Dummy variable for 1987	Positive			0.03605^{a1} (3.973)
Constant		-0.06782^{a} (-5.367)	-0.074549^{a} (-5.446)	-0.09260^{a} (-6.091)

Source: Authors calculations.

Significance is indicated as: a=1%, b=5%, c=10% and the number 1 following the letter indicates the significance is based on a one-tailed test